

AMERICAN METEOROLOGICAL SOCIETY

meteorological



abstracts and bibliography

Sponsored by
AIR FORCE CAMBRIDGE RESEARCH CENTER

Bibliography on Atmospheric Nuclei (1951-1955), p. 1306

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

EDITORIAL STAFF

Editor and Technical Supervisor: MALCOLM RIGBY

Corresponding Editor: DR. C. E. P. BROOKS

FULL TIME

ISADORE L. DORICK, *Chief Analyst*
MARY L. RICE, *Assistant Editor-Bibliographer*
WILHELM NUPEN, *Assistant Analyst*
DOROTHY M. GROPP, *Cataloguer*
GEZA THURONYI, *Bibliographer*
NINA S. ZIKEEV, *Bibliographer*
SOFIA ALEKSANDROV, *Technical Editor*

PART TIME

ANDREW ASSUR, *Analyst*
DORA M. BROOKS, *Cataloguer*
WINIFRED SCHRAITL, *Cataloguer*
MARINA SZE, *Indexer*
ALEXIS M. POUCHKIN, *Analyst*
KATHERINE MARTINOFF, *Assistant Technical Editor*
MARIA A. SNOW, *Assistant Technical Editor*
MARY G. DAVIS, *Typist*
BEVERLY HUGHES, *Typist*
SUSANNE MANOVILL, *Typist*

***EDITORIAL OFFICE:** Washington, D. C. **P.O. ADDRESS:** Box 1736, Washington 13, D. C. Telephone: REpublic 7-6278.

ADMINISTRATIVE OFFICE: American Meteorological Society, Office of Executive Secretary, 3 Joy Street, Boston 8, Mass.

* Address all business communications, orders and inquiries to the Executive Secretary, Mr. Kenneth C. Spengler, 3 Joy Street, Boston 8, Mass. Exchanges and reprints may be sent direct to P. O. Box 1736, Washington 13, D. C.

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY is a monthly publication devoted to:

- A. Current Abstracts in English on important meteorological literature in every language.
- B. Bibliographic references to other items of interest to the profession.
- C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists.

SUBSCRIPTION RATE: \$8.00 per year to members and non members. Single and back issues \$2.00. Back volumes, \$10 per volume.

This publication has been made possible through support and sponsorship extended by the Geophysics Research Directorate of the Air Force Cambridge Research Center, Air Research and Development Command, under Contract No. A. F. 19 (604)-302.

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 6

SEPTEMBER, 1955

No. 9



SPECIAL FEATURE IN THIS ISSUE

An Annotated Bibliography on Atmospheric Nuclei (1951-1955)

by
Nina S. Zikeev

(For complete table of contents see back cover)

Published monthly at Prince and Lemon Streets, Lancaster, Pa., by the AMERICAN
METEOROLOGICAL SOCIETY, 3 Joy Street, Boston 8, Mass.

Printed and issued by: Lancaster Press, Inc.

FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field and in related fields and to provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, etc., arranged according to the Universal Decimal Classification.

Part II of each issue comprises a special annotated bibliography of important references on a special subject. No attempt is made to prepare exhaustive bibliographies; instead, the aim is to include a representative cross section of the various aspects of a subject.

Bibliographies published in the successive issues were:

Vol. I, 1950

Atmos. Pollution	2. Aerobiology	3. Cloud Physics	4. Hail
Tornadoes	6. Volcanic Dust	7. Climat. Changes	8. Thunderstorms
Icing	10. Acoust. Propagation	11. Evaporation	

Vol. II, 1951

Extended Forecast.	2. Long Range Forecast.	3. Soil Temp.	4. Constants, etc.
Clim. of Near East	6. Clim. of Middle East	7. Special Winds	8. Radar Storm Detect.
Condensation Trails	10. Clim. of N.E. Africa	11. Mountain Met.	

Vol. III, 1952

Clim. of N.W. Africa	2. Carbon Dioxide	3. Clim. of Argentina, etc.	4. Dew
Objective Forecast.	6. Stratus Forecast.	7. Urban Climatology	8. Clim. of C. Africa
Visibility	10. Glaze and Rime	11. Free Air Turbulence	

Vol. IV, 1953

Turbulence Theory	2. Turbulent Diffusion	3. Frost	4. Clim. of Australia, etc.
High Level Winds	6. Winds in Stratosphere	7. Jet Stream	8. Radiation Bioclim.
Clim. of Pacific	10. Auroras	11. Sferics	

Vol. V, 1954

Oceanog. Met.	2. Clim. of S.E. Asia	3. Auroral Physics	4. Tropopause
Balloons	6. Numerical Forecast.	7. Radiation Data	8. Vertical Motion
Clim. of Arctic	10. Industrial Met.	11. Wind Waves and Swell	

Bibliographies published this year are:

- Bibliography of Bibliographies on Meteorology, Vol. 6, No. 1, Jan. 1955
- Textbooks and Monographs Containing Subject Bibliographies, Vol. 6, No. 2, Feb. 1955
- Storm Surges, Vol. 6, No. 3, March 1955
- Ionospheric Propagation, Vol. 6, No. 4, April 1955
- Photochemistry of Upper Atmosphere, Vol. 6, No. 5, May 1955
- Cloud Physics, Vol. 6, No. 6, June 1955
- Radar Cloud Physics, Vol. 6, No. 7, July 1955
- Atmospheric Nuclei (1841-1950), Vol. 6, No. 8, Aug. 1955
- Atmospheric Nuclei (1951-1955), Vol. 6, No. 9, Sept. 1955

Forthcoming bibliographies will be:

- Weather Modification, Vol. 6, No. 10, Oct. 1955

Other bibliographies in preparation are:

<i>Actinometers</i>	<i>Night Airglow</i>
<i>Arctic Synoptic Meteorology</i>	<i>Ocean-Atmosphere Energy Exchange</i>
<i>Climate of the Arctic</i>	<i>Ozone</i>
<i>Cosmic Rays in the Atmosphere</i>	<i>Singularities</i>
<i>Fog Forecasting</i>	<i>Snow Cover</i>
<i>Indoor Climatology</i>	<i>Synoptic Aerology</i>
<i>Microwave Propagation</i>	<i>Tropical Cyclones</i>

Part III contains a listing of the contents of those journals which are primarily meteorological. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. In the December issue cumulative author, subject, geographical and journal indexes are published.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DSG:	U. S. Army Medical Library, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory Library, Milton, Mass.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts.

Geographic locations are in the English form rather than the form used locally, for example Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146-151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, Jahrgang 2 (Volume 2), Heft 5/6 (No. 5/6), pages 146-151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

GENERAL AND SPECIAL COLLECTED WORKS

6.9-1 628.8 697 551.510.42:628.53
Bedford, Thomas, Heating and ventilation: introduction. Also: Crowden, G. P., The habitability of dwellings: heating and ventilation requirements; Brown, J. R., Physiological reactions of women to heat and humidity during work in the home; Parker, A., House heating and atmospheric pollution; Dick, J. B., Warmth and comfort in dwellings. *Advancement of Science*, London, 11(44):409-425, March 1955. fig., 3 tables, 13 refs. DLC—BEDFORD sets out desirable temperature and ventilation standards. He describes "corrected effective temperature" (black globe thermometer). CROWDEN summarizes the British Standards Institution Codes of Practice standards for indoor warmth and ventilation and describes recent research. BROWN describes experimental studies of effect of heat and humidity on pulse rate, sensations, sweating (measured by electric conductivity of skin of forehead) and Crampton Index. Small increases of wet bulb temperature in range 65-75°F caused marked increase of sweating and fall of Crampton Index, especially when ventilation was restricted. Results were checked in an air-conditioned cubicle. Appendix gives scales of heat, moisture and freshness. PARKER discusses pollution products from burning of coal and oil and changes from 1938 to 1952, and methods of reducing air pollution from domestic grates. He advocates replacement of bituminous coal in open fires by coke. DICK describes work at the Building Research Station on heat losses from houses, progress in insulation and performance of heating systems. *Subject Headings: 1. Heating and ventilating 2. Atmospheric pollution 3. Smoke abatement.—C.E.P.B.*

6.9-2 551.5:061.2(744)
Blue Hill Meteorological Observatory, Final Report, 1952-1953, on Contract Cwb-8310. Feb. 19, 1954. 66 p. Contents: Webber, J. P., Discussion of revised charts of vertical velocity, storm of Jan. 7-8, 1951, p. 1-9. 10 figs. Conover, John H., Effect of orography on precipitation amounts over the metropolitan area, p. 10-18. table, fig. Reed, R. J. and Honig, J., Atmospheric cooling by melting snow, p. 19-25. figs., 3 refs. Brooks, Charles F. and Brooks, Eleanor S., Snow or rain? p. 26-63. 27 refs., figs. Conover, John H., Collection and processing of World Weather Records, p. 64. Webber, John P., Critique of "Forecast Manual for New England," p. 65. Report of current weather at Blue Hill to the Weather Bureau at E. Boston, p. 66. DWB—In the first article "a series of revised charts of vertical velocity at 700 and 500 mb is shown for the snowstorm of Jan. 7-8, 1951 at Boston." Also charts of concurrent precipitation are shown—maximum upward velocities are 16 cm/sec at 700 mb and 24 cm/sec at 500 mb, downward velocities are generally less. Precipitation at the surface might be associated more easily with patterns of vertical velocity in the semi-circle to the north of the low center than in the semi-circle to the south of the low center. The Low advanced from the Mississippi Valley to the Maritime Provinces while deepening steadily. The second article, dealing with the effects of orography on precipitation amounts over the metropolitan area, is by CONOVER. An analysis of simultaneous wintertime, hourly precipitation rates at Blue Hill, Cambridge and East Boston shows that Blue Hill averages 9% higher than Cambridge and E. Boston for light precipitation and 5% higher for strong than weak winds during snow. The altitude effect is not evident during moderate to high precipitation. REED and HONIG write on atmospheric cooling by melting snow. The theory of the cooling of a saturated layer of air by melting snow is discussed and a synoptic analysis is presented of the snowstorm of April 13, 1953 during which the freezing level was driven down to the ground from about 6000 ft and caused a surface cooling at 8°F. In article on

snow or rain by CHARLES F. BROOKS and ELEANOR S. BROOKS, the authors discuss the factors involved in forecasting snow or rain, such as precipitation and temperature forecasting from sea-level weather maps, forecasting from upper air data, forecasting from the intensity of precipitation, forecasting from surface temperature and forecasting from a combination of surface and upper air temperatures. Collection and processing of World Weather Records by CONOVER is a brief summary of status of foreign reports received and an estimate of future work. Critique compiled by WEBBER of "Forecast Manual for New England" summarizes the criticisms by members of Blue Hill staff submitted to the District Forecasters at East Boston. *Subject Headings:* 1. Vertical velocities 2. Orographic rainfall 3. Precipitation forecasting 4. Temperature forecasting 5. World Weather Records 6. Forecast manuals.—I.L.D.

6.9-3

551.594.5:0

†Conference on Auroral Physics, July 23-26, 1951, London, Ontario, *Proceedings*. Edited by N. C. Gerson; T. J. Keneshea and R. J. Donaldson, Jr. *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30, July 1954. 459 p. numerous tables, diagrs. (incl. photos) and eqs. Bibliogs. throughout. Alphabetical author and subject indexes. **MH-BH**—The papers collected in this volume have been abstracted separately. They cover the theory and physico-chemical aspects of the aurora, sunlit aurora, radar and radio reflections from auroras, the airglow, laboratory investigations of upper atmospheric processes and auroral afterglow, interpretation of atmospheric emission, geomagnetic storms and aurora, solar and magneto-hydrodynamic waves and atmospheric absorption. Many references and a good index are included. *Subject Headings:* 1. Auroral physics 2. Upper atmosphere research 3. Conferences. I. Gerson, N. C. (ed.) II. Keneshea, T. J. (ed.) III. Donaldson, R. J. (ed.) IV. U. S. Air Force. Cambridge Research Center V. London, Ontario. Univ. of Western Ontario.—M.R.

6.9-4

551.511(08)

U. S. Naval Ordnance Laboratory, Silver Spring, Md., *Symposium on Turbulence*, July 1, 1949. A joint meeting with the Fluid Dynamics Division of the American Physical Society. Its *NOLR*, 1136, July 1, 1950. 85 p. Contents: Kampé de Fériet, J., Spectral tensor of homogeneous turbulence, p. 1-31. 3 figs., 27 refs., 44 eqs. Batchelor, G. K., Small-scale structure of turbulent motion, p. 33-41. 2 figs., 6 refs. Chandrasekhar, S., On Heisenberg's elementary theory of turbulence, p. 43-48. 2 refs., 19 eqs. Schuh, H. and Winter, K. G., Investigation of the turbulence characteristics of an experimental low-turbulence wind tunnel, p. 49-66. 10 figs., 4 refs. Frenkiel, F. N., On turbulent diffusion, p. 67-83. 7 figs., 6 refs., 31 eqs. **DWB**—These five articles are nearly self explanatory. In the first paper, KAMPÉ DE FÉRIET describes the 4 different kinds of averages which may be used in describing the statistical properties of turbulent velocity fluctuation. The statistical correlation tensor and statistical spectral tensor, the spatial correlation tensor and spatial spectral tensor for a sample function vector field are treated theoretically in detail. Appendix gives a long survey of method used for representing a stationary random function. In the second paper, BATCHELOR describes work performed by himself and TOWNSEND which showed that the regions of high energy in the midst of regions of low energy (found in small scale turbulence once initiated, tend to maintain themselves at the expense of the large scale eddies longer than simple decay theory would predict. Oscillograph records show similarity of isotropic turbulence $R_m=22,500$ to cylinder wake flow $R_d=4100$, though there is some consistent variation with Reynolds number not apparent with small changes in Reynolds number. In the third paper, CHANDRASEKHAR reviews two papers by HEISENBERG (see 4A-97 and 4A-98 Jan. 1953, *MAB*) on determination of spectrum of turbulence. The paper by SCHUH and WINTER describes measurements of turbulence in a 4'×3' wind tunnel built between 1942 and 1946 at Farnborough to study the effects of noise on low intensity turbulence, and other factors connected with hot wire anemometry. Equipment, operations and results are discussed and illustrated in detail. It is shown that in low level turbulence, noise is an important factor. Non-uniformities in flow approaching the fan, and fan noise, should be minimized. Effects of screens also studied. Quantitative data given on numerous diagrams. The final paper, by FRENKIEL, develops equations for turbulent diffusion in a fluid at rest, in a flowing

fluid, and gives results of experimental measurements of turbulent diffusion from a point source (see 4B-180, Feb. 1953, *MAB*). *Subject Headings*: 1. Turbulence symposia 2. Statistical theory of turbulence 3. Turbulent diffusion. I. American Physical Society.—*M.R.*

TEXTBOOKS

See also: Antarctic discoveries (Aagaard), 6.9-43.

6.9-5 551.582(7)

Kimble, George Herbert T., *Our American weather*. Maps and charts by Jean Paul Tremblay. N. Y. McGraw-Hill, 1955. 322 p. figs., tables, foot-refs. **DLC**—A popular book on month-by-month peculiarities of the weather or climate in all parts of North America. Each month is taken up in a separate chapter, and sections of the chapters deal with outstanding features of that season. Variety, rather than average conditions, is emphasized. Such unusual topics as wind chill (Jan.); snow cover, chinooks, blizzards, snow rollers and insulating properties of snow (Feb.); winds aloft and gustiness (March); showers, thunderstorms, frost and thawing (April); tornadoes and hail, cloud seeding and singularities (ice-saints) (May); warmest week of the year (July); flash floods, snow in summer, Arctic heat waves, year without a summer (1816), hurricanes and dew (Sept.); Indian summer (Oct.); smog and flying saucers (Nov.) and so on. A number of charts (for United States) are included to show variation in elements. *Subject Headings*: 1. Climate and weather of North America 2. Popular science books 3. United States 4. North America.—*M.R.*

6.9-6 551.5

König, Willi, *Grundzüge der Meteorologie*. [Elements of meteorology.] Leipzig, Teubner, 1953. 2nd enl. ed. 71 p. 21 figs. *Mathematisch-Physikalische Bibliothek*, Ser. 1, v. 70, 2nd ed. 1953. **DWB**—The author presents a non-technical introduction to the science of meteorology. The discussion aided with diagrams, maps and photographs includes the following: the general properties of the atmosphere, the genesis of temperature, its horizontal and vertical distribution, its determination by land, water and wind, etc.; air movement, including pressure distribution, vertical air movement, turbulence, etc.; moisture cycle in the atmosphere; some principles of climatology, characteristics of climates, the climate of central Europe, applied climatology; synoptic meteorology, pressure distribution and weather, air masses, fronts, etc.; meteorological instruments and methods of observation. *Subject Headings*: 1. General meteorology 2. Climatology.—*I.L.D.*

6.9-7 551.551(02)

Sutton, Oliver Graham, *Atmospheric turbulence*. 2nd ed. London, Methuen, and New York, John Wiley, 1955. 6+111 p. 4 figs., tables, refs., eqs. **GB-MO**—The second edition of this useful little book is brought up to date with an account of KOLMOGOROV's statistical theory, and some minor additions. Successive chapters deal with: Turbulence in general; The meteorology of the lower atmosphere; Early theories and their application to large-scale phenomena; Mixing length and statistical theories of turbulence; Diffusion in the atmosphere near the ground; Turbulence in a variable density gradient. The mathematics, essential to an adequate treatment, are kept as simple as possible. (For abstract of 1st ed., see 4-92; April 1950, 3K-142, March 1952 and 4A-106, Jan. 1953, *MAB*.) *Subject Headings*: 1. Turbulence 2. Textbooks.—*C.E.P.B.*

6.9-8 551.5:629.13(02)

*Szczecinski, Czesław, *Meteorologia na usługach lotnictwa*. [Aeronautical meteorology.] Warsaw, Wydawnictwa Komunikacyjne, 1952. 450 p. 37+15 tables, 164 figs. (incl. photos), map (fold.), 33 refs. **DLC**—This modern textbook consists of 14 chapters arranged under 4 major heads: I. Meteorological observations (general, atmosphere, winds and wind regimes, general circulation, water in atmosphere); II. Synoptic meteorology (air masses, fronts, synoptic analysis and forecasting); III. Aviation meteorology (weather effects on airplanes,

meteorological service to fliers, climatology as an aid to flying, thermals); IV. Statistical meteorology (tables in the text are listed, and then about 40 pages of nomograms, graphs and tables appear in the appendix). There is a good subject index. Most of the references are to Polish and Russian texts. *Subject Headings:* 1. Aeronautical meteorology texts 2. Text books 3. Polish language texts.—*M.R.*

MONOGRAPHS

6.9-9

551.510.53

*†Kaplan, J.; Schilling, G. F. and Kallmann, K. K., *Methods and results of upper atmosphere research*. California. Univ. Institute of Geophysics, Contract AF 19(604)-111 Scientific Report, No. 3, Nov. 30, 1954. 162 p. numerous figs., and tables; numerous refs. at end of most chs. **DWB**—A comprehensive collection and orderly arrangement of the most recent data on the structure and physics of the upper atmosphere as determined from Gun shell explosions (Chap. II), Rockets (III), Balloons (IV), Noctilucent clouds (V), Meteor (VI), Emissions from sky (VII), Sound propagation (VIII), Radio wave propagation (IX), Searchlight measurement (X) and Theory (XI). Report originally prepared by W. W. KELLOGG and G. F. SCHILLING in June 1950 (see 4F-52, June 1953, *MAB*), but has been revised to include data published up to 1954 as indicated in references cited. The actual data, models, cross sections, graphs, etc. cited in each section are reproduced in profusion and thoroughly annotated. *Subject Headings:* 1. Upper atmosphere research methods 2. Upper atmosphere structure 3. Upper atmosphere models 4. Upper atmosphere data.—*M.R.*

6.9-10

551.579

*†Lyshede, J. M., *Hydrologic studies of Danish watercourses*. *Folia Geographica Danica* Copenhagen, v. 6, 1955. 155 p. 41 figs., 16 tables, bibliog. p. 128-134. Danish resume p. 135-155. At head of t-p: Meddelelser fra det Danske Hedeselskabs Kulturtekniske Afdeling Hydrometriske Undersøgelser. **DWB**—A remarkably thorough monograph using all available Danish precipitation and hydrologic records since 1917 to (A) determine variations in runoff from place to place (influence of soil, precipitation, evapotranspiration, topography, geologic conditions, artificial drainage, etc. on runoff); (B) annual and long period variations; measurement, prediction and description of runoff, unit hydrographs, catchment (lakes, bogs, woods, cities, etc.) and influences on floods or maxima, and in section (C) statistical analysis of records appended in a good bibliography of over 200 items. Analyses are compared with those made in U. S. and Europe to determine applicability of foreign studies. *Subject Headings:* 1. Hydro-meteorological studies 2. Precipitation and runoff 3. Denmark.—*M.R.*

6.9-11

551.584.31:634

*Uehara, Masaki (*Kagawa Agr. College*), *On the micrometeorology at the Slope Farm* (First report). *Kagawa, Japan. Agricultural College, Technical Bulletin*, 1(1):46-57, March 1949. graphs, tables, 14 refs. In Japanese; English summary p. 57. . . . , second report *Ibid.*, 1(3):1-13, Feb. 1950. tables, charts. English summary p. 13. And: . . . Pt. 3 *Ibid.*, 2(1):31-38, Nov. 1950. figs., tables, 8 refs. English summary p. 38. Also his *Study on the cultivation and utilization of Slope Farm*, pt. 3, *Micrometeorological study in autumn on the Slope Farm*. *Ibid.*, 2(3):178-185, March 1951. Also his: *Study on the cultivation and utilization of Slope Farm*, pt. 6. *Micrometeorological study in winter on the Slope Farm*. *Ibid.*, 3(1):1-10, May 1951. tables, graphs. English summary p. 9-10. **DWB**—A series of 6 papers are presented giving an analysis of results of continuing micrometeorological experiments in an orchard (persimmon and orange) on the NE and SW slope of an oval hill. Four observation points were selected to measure air temperature, relative humidity, soil temperature, evaporation and wind every 2 hours. The first study was for 24 hours from Sept. 25-26, 1948. Graphs show lapse rates of temperature, humidity and soil temperature, and diurnal range in these elements as well as depth of constant soil temperature for 24-hour period. The next study was for May 20, 21, June 29 and 30, 1949, using 6 stations and with temperature observed at points up to 350 cm and soil temperature to 50 cm depth.

Plant temperature (trunk of a persimmon tree) was recorded from thermo-junctions at surface and in the bark, on SW and NE side of trunk and in upper and lower part of orchard. Also whitewashed and non-whitewashed trunks were compared. Thermal diffusivity of soil is calculated from harmonic analyses of depth and amplitude changes of soil temperature. The third study was for July 13 and 14 and Aug. 9 and 10, 1949, using same sites as 2nd study, and presenting data and harmonic analyses, etc. in a similar way. Study 5 gives analysis of data for autumn days (Sept. 27-28, Oct. 28-29 and Nov. 25-26, 1949). A Gorczyński solari-meter was used for the first time, with observations each hour on SW and NE slopes, respectively. The final study was for winter (Dec. 18-19, 1949, Jan. 20-21 and Feb. 25-26, 1950). The winter was unusually warm. Solar radiation was greatest on SW slope, next on level field and least on NE slope. At 10 cm depth min. temperature was in Jan.; at 50 cm in Feb. Humidity lapse rates were least on the higher ground and in the daytime; greatest on low ground and at night. *Subject Headings:* 1. Slope micrometeorology 2. Micrometeorological data 3. Orchard microclimatology 4. Kagawa Agricultural College, Japan.—*M.R.*

6.9-12

551.547.2(02)

World Meteorological Organization, **Reduction of atmospheric pressure.** Preliminary report on problems involved. Its *Technical Note*, No. 7; *WMO* No. 36. TP. 12, 1954. 35 p. table, 29 eqs. DWB—A survey of methods used in 59 meteorological services to reduce pressure observed at a station to sea level pressure. The information was obtained by a questionnaire sent to the services in 1952/3. The International Meteorological Tables (Paris 1890) contained an "International" Formula based on LAPLACE's method of reduction, and on ANGOT's simplification thereof. These formulas are described in detail, and the countries using the metric and the English unit versions, respectively, are listed. Fifteen other formulas or methods used in 20 countries are then set forth, and finally the report of CIMO Working Committee on Reduction of Pressure presented. *Subject Headings:* 1. Pressure reduction 2. Manuals 3. World Meteorological Organization.—*M.R.*

GENERAL GEOPHYSICS AND METEOROLOGY

GENERAL METEOROLOGY

See: Elements of met. (König), 6.9-6; Aeron. met. (Szczecinski), 6.9-8; Met. references (Baum), 6.9-40; Chinese met. (Chu), 6.9-44; Obituary of Prof. Regener (Blackett), 6.9-46; Biogr. of G. E. Stokes, 6.9-47.

EXPEDITIONS

See also: S.E. Iceland Exped. (King), 6.9-16; Greenland Ice Cap, 6.9-58; Thickness of Greenland Ice Cap (Joset), 6.9-59.

6.9-13

91:04(99)

Dautert, Erich, **Der Wettlauf zum sechsten Kontinent. Zwei Jahrhunderte Abenteuer- und Entdeckerfahrten in die Antarktis.** [The race to the sixth continent. Two hundred years of adventure and exploration in Antarctica.] Oldenburg (Oldb)/Hamburg, Stalling, 1954. 288 p. illus., ports., photos. DLC—A popular historical account of the exploration of Antarctica beginning with early mythological accounts of the South Pole. In brisk and dramatic fashion the author describes the various explorers and expeditions in Antarctica from Bellingshausen to Byrd. Stress is placed upon adventure rather than upon scientific results. The book has numerous photographs. *Subject Headings:* 1. Antarctic expeditions 2. Antarctic exploration 3. Antarctica.—*I.L.D.*

6.9-14

551.501.9:629.13(98) 551.5:656.71(98)

Forbes, Alexander, **Quest for a northern air route.** Cambridge, Harvard Univ. Press, 1953. 138 p. maps, photos., bibliog. following p. 138. DWB—Popular account of the aerial reconnaissance for and the establishment of air bases (Goose Bay and Crystal I, II and III) in Labrador and the Hudson Bay Region during World War II for ferrying fighter planes

to England by the short-hop method. Locations free from fog and stormy winds were favored. A major part in establishing the bases was played by the late CHARLES J. HUBBARD (Lt. Comdr. U. S. N.) who also had intimate knowledge of Labrador and the Canadian Archipelago and later was in charge of U. S.-Canadian Arctic stations farther north. Weather equipment was installed at Goose Bay, Chimo and Frobisher Bay under his supervision in 1941-2. Details of weather encountered in air, sea and on land are scattered through this book, giving a fair picture of Canadian sub-Arctic weather. *Subject Headings:* 1. Arctic air bases 2. Arctic weather reconnaissance 3. Arctic weather stations 4. Labrador 5. Canadian Archipelago. I. Hubbard, Charles J.—*M.R.*

6.9-15

551.501.9(268)

Soloukhin, V., "Vsem bortam!" ["To all ships!"] *Ogonek*, Moscow, 32(4):8a, B Jan. 24, 1954. 5 illus. *DLC*—Colored photographs are presented on two large size pages of this magazine, showing the equipment and observational activities at a station on the Arctic Ocean (Kara Sea). Buildings, outside lighting, 3 thermometer shelters at least 2 m above snow surface, filling a pilot balloon outdoors, measuring temperature of water under ice and other activities are illustrated and described briefly. *Subject Headings:* 1. Arctic weather stations 2. Kara Sea.—*M.R.*

6.9-16

551.506.3(491) 551.311.12(491)

King, C. A. M. (Nottingham), *The University of Nottingham South-East Iceland Expedition 1953, Pt. 3, Geomorphological and glaciological observations made in North-West Öraefi* *Weather*, 9(12):374-379, Dec. 1954. fig., plate, 7 refs. *DWB*—The section on geomorphology describes the effect of climate and past climatic changes on landscape. Evidence of glacial advances and warmer periods was found. Under glaciology the structure and movement of the glaciers are described. (For Pts. 1-2, see 6.1-54, Jan. 1955, *MAB*.) *Subject Headings:* 1. Expeditions 2. Glaciology 3. Climatic changes 4. Iceland.—*C.E.P.B.*

6.9-17

551.509.31(1)

*Jalu, Raymond, *Mission aux Iles Kerguelen, 1949-1950. Rapport Préliminaire*. [Kerguelen Isles Mission, 1949-1950. Preliminary Report.] *France. Météorologie Nationale Mémorial*, No. 37, 1952. 80 p. 45 figs., 19 photos., 21 refs. *DWB*—A monographic report of the activities of the French station set up at Port aux Français on the Courbet Peninsula on the main island of the Kerguelens (lat. 48°27'S) which lie in the S. Central Indian Ocean Basin. The purpose of the expedition was to determine the feasibility of a permanent station in that location. The report contains analyses based on data from all parts of the Indian Ocean, of synoptic situations of various types, illustrated by detailed analyzed surface charts and supported by reproductions of automatic records and tabular as well as descriptive material. Trajectories of cyclones along the Antarctic front; normal charts of pressure and sea temperature; and a discussion of clouds (nicely illustrated with cloud photographs), winds, visibility, winds aloft, upper air temperatures, lapse rates, precipitation and sunshine are included. Föhn effects are pronounced in this location. *Subject Headings:* 1. Synoptic aerological studies 2. Kerguelen Islands 3. Antarctic. I. Viaut, André.—*M.R.*

OBSERVATORIES

6.9-18

551.501.9:551.43(798)

Korff, Serge A. (New York U.), *The Mount Wrangell Observatory*. *Science*, 118(3067):420, Oct. 9, 1953. *DWB*—Description of location (62°N, 144°W, 14,000 ft alt.), communications, structures and supplies of the observation station established on the summit of Mount Wrangell, Alaska, in the summer 1953. *Subject Headings:* 1. Mountain observatories 2. Arctic weather stations 3. Mount Wrangell Observatory, Alaska.—*G.T.*

6.9-19

522.1

Rosselland, S., *Astrofysisk institutt—Solobservatoriet*. [Astrophysical Institute—Solar Observatory.] *Naturen*, Bergen, 78(7):207-215, 1954. 5 figs. *DWB*—The history of the Solar Observatory is outlined. A solar observatory rather than a stellar was chosen because (1) the sun is the necessary and primary factor in understanding of various conditions

on the fixed stars, (2) radio-astronomical observations of solar activity and simultaneous optical observations are facilitated and (3) interest in the relationship between solar activity and weather phenomena has increased. Brief descriptions of instrumentation, buildings, etc. are given. *Subject Headings: 1. Astronomical observatories 2. Solar activity 3. Oslo, Norway.—W.N.*

6.9-20

522.1(09)

Shcheglov, V. P., *Tashkentskaia Astronomicheskaiia Observatoriia*. [Tashkent Astronomical Observatory.] *Priroda*, Moscow, 43(4):59-63, April 1954. photos. DLC—The activities of the Tashkent Observatory were greatly expanded in the post-revolutionary years. Before the revolution such well known names in astronomy as POMERANTSEV and GEDEONOV were among the directors of the Observatory. A solar laboratory was organized which now is equipped with a double 6 in. refractor for visual observation of sun spots and protuberances; beginning with 1948 it observes and studies regularly the chromospheric flashes on the basis of spectrohelioscopic and spectrographic observations. Lunar eclipses have also been studied by the Observatory staff. The Observatory took part in 1936, 1941, 1945 and 1952 (Chile) in expeditions for the observation of total eclipses of the sun. The Central Geophysics Laboratory of the Academy of Sciences was located at the Tashkent Observatory for the 4 war years. Expert astronomers have been and still are being trained at the Observatory. *Subject Headings: 1. Tashkent Astronomical Observatory, Uzbekistan 2. History of observatories 3. Solar eclipses.—A.M.P.*

6.9-21

551.501.9(411)(09)

Paton, James, *Ben Nevis Observatory 1883-1904*. *Weather*, 9(10):291-308, Oct. 1954. 4 photos. Also: Wilson, C. T. R., *Ben Nevis sixty years ago*. *Ibid.*, 309-311, color photo. MH-BH—PATON's interesting article sets out the history of the Observatory from the first proposal in 1875. In 1881-83 C. L. WRAGGE climbed to the summit daily to make observations. In 1883 funds were subscribed to construct the bridle path and observatory which was opened on Oct. 17; hourly eye observations began Nov. 28. Telegraphic reports were transmitted by pigeon post. The weather is described graphically with extracts from the log. Scientific work by visitors is summarized. Owing to financial difficulties the observatory was closed on Oct. 1, 1904. WILSON describes his experiments at the summit in 1894 and refers to a color photo of a glory. *Subject Headings: 1. Ben Nevis Observatory 2. History of observatories.—C.E.P.B.*

INSTITUTIONS (IGY, IUGG AND WMO)

6.9-22

551.5:06 55:06

Exploring the ionosphere. *News of Norway*, Wash., D. C., 11(41):162, Nov. 18, 1954. DLC—Brief news report outlining the plans for Norwegian participation in the International Geophysical Year, 1957-58. The Aurora Borealis Institute at Tromsø will be the center of investigations mainly concerned with ionospheric soundings and auroral research. Other institutes will participate and new facilities will be added to those available at Spitsbergen and Björnöya (Bear) Islands. *Subject Headings: 1. International Geophysical Year program 2. Ionospheric soundings 3. Auroral research 4. Norway.—G.T.*

6.9-23

551.582.2(99)

*Bouvet Island. *South Africa. Weather Bureau, News Letter*, No. 63:1-2, June 30, 1954. DWB—A geographical description of the island (including some climatic data) upon which a meteorological station is to be established by the Union of South Africa in connection with the International Geophysical Year in August 1957. *Subject Headings: 1. Climatic data 2. Climate of Bouvet Island 3. Meteorological stations 4. International Geophysical Year program 5. Bouvet Island, South Atlantic Ocean.—I.L.D.*

6.9-24

551.521(08)

Ångström, Anders, *Introduction to the symposium on radiation*. *I.U.G.G. Association of Meteorology, Brussels, 1951, Procès-Verbaux des seances, Mémoires et discussion*. p. 199-200.

pub. Brussels, 1953. DWB—A presidential address, in general form, declaring that a broad coverage of the problem was desired. The symposium itself consists of 9 papers of varying quality and one addendum. Subjects: albedo of clouds, long wave radiation, general radiation balance, phenomena of blue sun, pyrhelimeters, solar radiation, night frosts. *Subject Headings: 1. Radiation research 2. Symposia.—A.A.*

6.9-25

551.578.4:061.3 551.311.1:061.3

Hoinkes, H., Bericht über die Sitzungen der Kommission für Schnee und Eis der Internationalen Assoziation für Hydrologie während der 10. Generalversammlung der Internationalen Union für Geodäsie und Geophysik (U.G.G.I.) in Rom, 14. bis 25. September 1954. [Report on meetings of the Commission for Snow and Ice of the International Association for Hydrology during the 10th General Meeting of the U.G.G.I. in Rome Sept. 14-25, 1954.] *Zeitschrift für Gletscherkunde und Glazialgeologie*, 3(1):116-124, Dec. 1954. DLC—A number of papers read are summarized including Presidential Address by SELIGMAN, G., Recent trends in glaciological research. *Subject Headings: 1. I.U.G.G. Association for Hydrology Commission for Snow and Ice 2. I.U.G.G. meetings.—C.E.P.B.*

6.9-26

551.5:92

Dr. K. R. Ramanathan. *Current Science*, Calcutta, 23(11):350, Nov. 1954. DLC—Note announcing the election to the presidency of the International Union of Geodesy and Geophysics of K. R. RAMANATHAN of India. The wideness of his scientific interests and the outstanding contributions he has made to the knowledge of the upper atmosphere are mentioned. The appointment appears especially significant in view of the forthcoming International Geophysical Year. *Subject Headings: 1. Ramanathan, K. R. 2. International Union of Geodesy and Geophysics 3. Biography.—G.T.*

6.9-27

551.5:550.38:06

International Union of Geodesy and Geophysics. Association of Terrestrial Magnetism and Electricity, Rome general assembly, Sept. 1954. *I.U.G.G., Bulletin d'Information*, 3(5):55-56, April 1954. DWB—Lists reports of 15 special committees of the IATME which will be given at Rome. These include committees on sites for new observatories, on aurora, secular variations, magnetic charts, publications of observatories, observation techniques and joint committees with IAM, etc. on atmospheric electricity and on upper atmosphere. Topics for discussion at Rome (7) are listed and joint meetings with IAM enumerated. *Subject Headings: 1. I.U.G.G. International Association of Meteorology 2. I.U.G.G. International Association of Magnetism and Electricity 3. I.U.G.G. meetings.—M.R.*

6.9-28

551.515.2:06 551.509.5:551.515.2

World Meteorological Organization. Regional Association IV. Eastern Caribbean Hurricane Committee, Report of the Third Session, March 1954. *World Meteorological Organization, ECHC*, 3, 1954. each section renumbered. DWB—W. A. GRINSTED, chairman of committee, presided. Seven members (from Canada, U. S., Bermuda, France, Netherlands Antilles, Dominican Republic and British Caribbean territories), one invited guest (from Venezuela) and 15 advisers plus 7 observers were present. The meeting was held March 24-26, 1954 at Kent House, Port of Spain, Trinidad. Modifications in the Hurricane Warning Service, coordination of radiosonde work, improvement of entire Caribbean network (synoptic, pibal and rawinsonde), training of observers, solar radiation network (13 stations to be established in Venezuela), radio teletype equipment and CARMET broadcasts, International Geophysical Year, ship reports, communication facilities, WMO. Technical Assistance Program and a number of other subjects were discussed. Three resolutions and 22 recommendations were made and are presented. *Subject Headings: 1. WMO. Regional Association IV 2. Eastern Caribbean Hurricane Committee 3. WMO. meetings 4. Caribbean networks 5. Hurricane warning services.—M.R.*

6.9-29

551.5:06

Schwarz, U. (Israel Met. Serv.), A Technical Assistance fellowship in meteorology. *World Meteorological Organization, WMO Bulletin*, 4(1):25-27, Jan. 1955. photo. DWB—Experiences of the author (a forecaster from Israel) in working as an exchange fellow with the

Portuguese Aviation Meteorological Service at Lisbon, and at the KNMI in the Netherlands, are related. Benefits from such exchange are said to be very real, though intangible. Most benefits come from visiting a country with a high theoretical standard, yet with actual conditions similar to those in one's own country. In this case the charts analyzed by the author in Holland were those brought back by W. BLEEKER from Israel when the latter was there on the Assistance Program. *Subject Headings:* 1. WMO. Technical Assistance Program 2. Exchange fellows in meteorology 3. Portugal 4. Netherlands 5. Israel. I. Bleeker, W. —M.R.

6.9-30

551.5:06

Technical Assistance Programme. *World Meteorological Organization, WMO Bulletin*, 4(1):10-14, Jan. 1955. DWB—Budget for 1955 for Technical Assistance in meteorology amounts to about \$140,000. The Program in Africa, Asia, Europe, Latin America and the Middle East (15 countries) is outlined, and the 1956 program (at least \$110,000) suggested. Reports of experts on past studies have been prepared and 14 of these are being declassified by the U.N. and will be available. Details of the 1954 program in Libya, Dominican Republic, Haiti, Syria, Turkey and Yugoslavia are given. *Subject Headings:* 1. WMO. Technical Assistance Program 2. Technical Assistance reports.—M.R.

SOCIETIES

6.9-31

551.5:550.3:06(04)

American Geophysical Union, *Alphabetical and geographical lists of members. Lists of Committees. List of publications.* Its *Transactions*, 35(6), Part 2, Dec. 1954. 130 p. MH-BH—This list is a revision of the list published as Pt. 2 of *AGU Transactions*, 33(5), Oct. 1952. It follows the same general arrangement—that is an alphabetical list of 5000 members and corporations, then a geographical list (by states and countries) of members. A code letter indicates which of the 8 branches of Geophysics the member is concerned with. Members of Committees, and publications available or out of print (and prices thereof) are appended at end of issue. *Subject Headings:* 1. Membership lists 2. American Geophysical Union 3. Publication lists.—M.R.

6.9-32

551.5:061.2(43)

van Eimern, Josef, *Tagung der Deutschen Meteorologischen Gesellschaft in Hamburg vom 8.-11. Oktober 1954.* [Meeting of the German Meteorological Society.] *Erdkunde*, 9(1):75-76, Feb. 1955. DWB—Summaries are given of a number of papers on climatology, marine meteorology, atmospheric circulation, ground water variations, evaporation and energy balance, etc. K. KNOCH gave an address on the life and work of G. HELLMANN, born 100 years ago. *Subject Heading:* 1. German Meteorological Society.—C.E.P.B.

6.9-33

551.510.53(05) 001.89(05)

Max-Planck-Gesellschaft zur Förderung der Wissenschaften, *Tätigkeitsbericht für die Zeit vom 1.4.1952 bis 31.3.1954.* [Report of the Max Planck Institute for the Advancement of Knowledge, April 1, 1952-March 31, 1954.] *Naturwissenschaften*, Berlin, 41(23-24):537-548; 561-569, Nov., Dec., 1954. DWB—No. 23 includes reports of the Institutes for Instrument Technology (including calculating machines) p. 540, Ionosphere investigation (p. 541, observations, apparatus, statistical and theoretical works, relations with other phenomena), and Physics (including cosmic radiation). No. 24 (p. 561-562) includes the report of the Institute of Physics of the Stratosphere. Work described includes cosmic radiation, vertical distribution of ozone, investigations of freezing nuclei, föhn sickness and atmospheric electricity. The Hechingen High-tension Laboratory describes a high-frequency ion source for impulse modification. *Subject Headings:* 1. Max Planck Institute 2. Ionospheric research 3. Stratospheric research.—C.E.P.B.

NETWORKS AND SERVICES

6.9-34

551.5:06(09)

Escobar V., Ismael, *La meteorología en Latino-America.* [Meteorology in Latin America.] *Revista Meteorológica*, Montevideo, 13(46):34-45, June 1954. 15 refs. MH-BH

—Histories of the meteorological services of Argentina, Bolivia, Chile, Peru, San Salvador Uruguay and Venezuela, and their principal activities, are outlined. *Subject Heading: 1. History of meteorological services.—G.T.*

6.9-35

551.582(83)

*Great Britain. Meteorological Office, Chile, pt. 3, *Meteorological notes*. Its *I.D.C.R.* No. 80, London, 1954. 20 p. 18 tables. Mimeo. GB-MO—General description of Chile, list of meteorological stations and regional climatic features. Then follow summaries of wind direction, land and sea breezes, mountain and valley winds, gales, upper winds, temperature (means and extremes), humidity, sea surface and upper air temperature, visibility, cloud amount and height, precipitation, snow, thunder and height of freezing level. *Subject Headings: 1. Local climates 2. Chile.—C.E.P.B.*

6.9-36

550.3

Johnston, H. Freeborn, *List of geomagnetic observatories and Thesaurus of values*. *Journal of Geophysical Research*, 56(3):431-438, Sept. 1951. 2 tables. MH-BH—The geographic coordinates of 72 magnetic observatories are given in addition to other data. The stations are listed in order from Thule, Greenland at 76°N to Laurie Island at 61°S. Several new observatories are listed. *Subject Headings: 1. Geomagnetic observatories 2. Geomagnetic networks.—M.R.*

6.9-37

551.501.9:551.521

Drummond, A. J., *Solar radiation networks in Africa*. *South Africa, Weather Bureau Notes*, 2(4):262, 1953. DWB—Note on extension of solar radiation networks adopted at the first session of the Regional Association I (Africa) of the WMO at Tananarive in Jan. 1953. Actinometric standards will be maintained at Pretoria, Leopoldville and possibly in Algiers. The existing network is briefly described. *Subject Headings: 1. Solar radiation networks 2. World Meteorological Organization 3. Africa.—A.A.*

6.9-38

551.501.9(679)

Mozambique. (Meteorological Service?). [Latitude, longitude and altitude in meters of] *meteorological stations, Mozambique*. [1953?] 3 p. Carbon of typescript. At head of each page: Appendix 1, Despatch No. 47, Lourenco Marques. DWB—A list of 8 first order and 100 second order stations with coordinates of each for Mozambique. The highest station is Vila Cabral at 1365 m. *Subject Headings: 1. Meteorological stations 2. Mozambique.—M.R.*

6.9-39

551.501.9:551.509.21(47)

U. S. Weather Bureau, *List of synoptic stations of the Union of Soviet Socialist Republics*. Information furnished by the World Meteorological Organization. Wash., D. C., Jan. 1953. 32 p. "List of stations coming into force Feb. 15, 1953." DWB—A list of over 1200 meteorological stations reporting over the synoptic network which is located in European and Asiatic U.S.S.R., with the corresponding international index numbers, latitude, longitude and elevation of each. The index numbers are effective Feb. 15, 1953, and run from 20,107 to 38,987 (actually 20,000 to 39,999 are assigned to the Soviet Union), and range from Barentsburg at 78°04'N to Kushka at 35°17'N, and from Ostrov Ratmanova (near Cape Schmidt) at 169°05'W to Kaliningrad at 20°37'E, being arranged by longitude according to belts of latitude. *Subject Headings: 1. Synoptic networks 2. Meteorological stations 3. U.S.S.R.—M.R.*

PRACTICAL AND APPLIED METEOROLOGY

BIBLIOGRAPHY AND EDUCATION

6.9-40

551.5:016

Baum, Werner A. (*Met. Dept., Fla. St. Univ.*), *A study of reference citations in the Journal of Meteorology and the Quarterly Journal of the Royal Meteorological Society*. *American Meteorological Society, Bulletin*, 36(2):61-63, Feb. 1955. 2 tables. MH-BH—References

ted in ten volumes (1944-1953) of the *Journal of Meteorology* and the *Quarterly Journal of the Royal Meteorological Society* were analyzed for country and year of publication of the references. American and British authors are found to have remarkably similar referencing patterns. Both rely primarily on the literature of their own nation and on quite recent literature. They rely to almost the same extent on the literature of various foreign nations, and both display very little utilization of the available Soviet publications. A proposal is made for annual publication of a survey of significant advances in Soviet meteorology. *Subject Headings:* 1. Meteorological reference studies 2. Literature citations 3. Language utilization. *Royal Meteorological Society II. Journal of Meteorology.—Author's abstract.*

6.9-41

621.396:016:019.4

†Carpenter, Martha (Stahr) (Cornell Univ.), *Bibliography of extraterrestrial radio noise.* Issued as part of the Report of Commission V to the IXth General Assembly of the International Scientific Radio Union. Cornell University. School of Electrical Engineering, Contract N6onr-26406, NR 077-321, Radio Astronomy Report, No. 11, Aug. 15, 1950. 129 p. **WB**—The 280 annotated references in this bibliography are classified according to: (A) Radiation from the sun, (B) General galactic radiation, (C) Radiation from "discrete sources," (D) Radiation from the moon. In each section the works are divided into (1) observations and (2) theories and interpretations, and chronologically within each subsection. Also a section on miscellaneous items and one on reviews are included. Many of the abstracts are from standard journals and about half by the author. An author index is appended. Titles are given in the original language (except Russian titles which are given only in English translation). *Subject Headings:* 1. Radio frequency radiation bibliographies 2. Abstracts. *International Scientific Radio Union.—M.R.*

6.9-42

550.3:378

Zych, Stanisław, *Gdzie i jak studiować geofizykę na stopniu uniwersyteckim.* [Where and how to study geophysics at the university level.] *Gazeta Obserwatora PIHM*, Warsaw, (4):16, April 1951. **DLC**—A concise review of the programs and institutions teaching the science of geophysics at the university level, and its main subdivisions—physics of the lithosphere, hydrosphere, atmosphere and meteorology is presented and discussed. It is also shown that the demand for educated and specialized workers in this field is great in modern Poland. *Subject Headings:* 1. Teaching of geophysics 2. Poland.—*A.M.P.*

HISTORY AND BIOGRAPHY

See also: *Explor. of Antarctica* (Dautert), 6.9-13; *Ben Nevis Observ.* (Paton), 6.9-21; *Dr. Ramanathan*, 6.9-26.

6.9-43

91.04(09,99)

†Aagaard, Bjarne, *Antarktis, 1502-1944. Oppdagelser, naturforhold og suverenitetsforhold.* [Antarctica 1502-1944, discoveries, nature and sovereignty status.] Oslo. Norsk Polar-institutt, *Meddeleser*, No. 60, 1944. 306 p. 126 illus., 26 maps, bibliog. p. 277-280. **DLC**—This monograph contains an account of the exploration, of the sovereignty problems and of the physical geography of Antarctica. The historical account extends over the period 1502-1944. The discussion is nontechnical; the description of the climate is very brief giving isolated data on the conditions and some mean values of temperature, wind velocity and pressure at a few points. Principal attention is devoted to explorations. There are numerous maps and photographs of the various explorers. A selected bibliography is included. *Subject Headings:* 1. History of Antarctica 2. Antarctic exploration 3. Antarctic bibliographies 4. Antarctica. —*I.L.D.*

6.9-44

551.5(09)

[Chu, Co-ching?], *Iz istorii kitaiskoj meteorologii.* [From the history of Chinese meteorology.] *Voprosy Geografii*, No. 35:278-284, 1954. 3 foot-refs. On t-p: Ke-chzhen' Chzhu. Translation from Chinese by IA. M. Berger. Price: 13 rub. 50 kop. **DLC**—The author begins the history of meteorology in China with the early folk sayings about weather

which go back to the 12th century B.C. They are followed by historic records of weather phenomena and the climatic descriptions in the dynastic histories. Both the rain gage and the anemometer were invented in China in the 15th and 12th centuries, respectively. The development of meteorological observations under European influence is discussed. *Subject Headings: 1. History of meteorology 2. Meteorological instruments 3. China. I. Berger IA. M. (trans).—I.L.D.*

6.9-45

536.5 (09) 551.508.2 (09)

Chaldecott, J. A., *Handbook of the collection illustrating temperature measurement and control, Pt. 2, Catalogue of exhibits with descriptive notes.* London, Science Museum, 1955. 6+57 p. 6 plates. GB-MO—This book is in effect a history of thermometry. Sec. I includes descriptions of a number of thermoscopes beginning with classical times. The first instrument for measuring temperature was designed by GALILEO in 1592. II. deals with 17th and 18th century sealed thermometers, beginning with the Florentine thermometer of 1641. III. describes expansion thermometers, covers a variety of instruments, including earth thermometers, fluorescent alcohol (for arctic use), mercury-in-steel, bimetallic, max and min. and deep sea thermometers. A photo is given of the original Kew thermometer testing bath. IV. includes resistance thermometers, V. thermocouples, VI. and VII. pyrometers, VIII. temperature recorders, beginning with the Callendar (1897) and IX. thermographs. *Subject Headings: 1. History of thermometry 2. Thermometers.—C.E.P.B.*

6.9-46

551.5:92

Blackett, P. M. S., *Obituary of Prof. E. Regener.* *Nature*, London, 175(4469):1107-1108, June 25, 1955. DWB—Born near Bromberg, Nov. 12, 1881, died Feb. 27, 1955. In 1911 became Professor of Physics and Meteorology at Agricultural High School, Berlin, and in 1920 Director of Physics Dept. of Technical High School, Stuttgart. Investigated cosmic rays under water and in upper air. During the war became Director of laboratory at Friedrichshafen for investigation of stratosphere. *Subject Headings: 1. Biography 2. Regener, E.—C.E.P.B.*

6.9-47

551.5:92

Hutchinson, G. Evelyn (Yale Univ.), [Sir George G. Stokes]. *American Scientist*, New Haven, Conn., 41(1):116-124, Jan. 1953. port., 6 refs. DLC—STOKES was born in 1819 in County Sligo, Ireland, of parents who were of English ancestry. Died Feb. 1, 1903. He made many important discoveries in hydromechanics, polarization of light, fluorescence and other optical and physical problems. He determined the law of velocity of fall of small water droplets in air, $V = 2/9g(\rho' - \rho)m^{-1}a^2$ or Stokes' law, thus explaining the existence of clouds which had hitherto been theoretically impossible. Other discoveries were on chlorophyll and blood. He was the first to discover and name the phenomenon called fluorescence making it possible to measure solar radiation in the UV bands of the spectrum. He spent many years advising writers and others on meteorological problems. *Subject Headings: 1. Stokes, Sir George G. 2. Biography 3. Stokes' law 4. Fluorescence.—M.R.*

ASTROPHYSICS

See also: Astroph. Inst. (Rosseland), 6.9-19.

6.9-48

523.5

Kvale, Anders, *Meteorsteiner.* [Meteorites.] *Naturen*, 78(13):386-403, 1954. DLC—The composition of different meteorites investigated suggests that they are fragments of small planets that burst in space. Meteorites are composed of 27 different minerals of which 20 exist on the earth. The arrival velocity per gr. of meteorite, with a specific weight of 7. is tabulated and based on the formula $E/m = 1/2 v^2$ (E =energy, m =mass and v =velocity). *Subject Heading: 1. Meteorites.—W.N.*

6.9-49

523.7

Anderson, C. N., *Notes on the sunspot cycle.* *Journal of Geophysical Research*, 59(4):455-461, Dec. 1954. 5 figs., 2 tables, 3 refs. MH-BH—Indication that the long series of sunspot

cycles is beginning to repeat itself within recorded data has renewed interest in the question of the components which are involved. One difficulty encountered in previous attempts at isolating the components has been in not basing the analysis on an integral number of cycles. If long period recycling proves to be real, component analysis is materially simplified and the resulting clues may be an important factor in developing sunspot theory. This paper presents the basis for the period of the series of 11-year cycles, the results of an analysis of the components of the sunspot cycle and, lastly, the negative results of trying to attribute any part of the sunspot cycle to gravitational effects of the planets. *Subject Headings: 1. Sunspot cycles 2. Sunspot data analysis 3. Gravity effects.—Author's abstract.*

6.9-50

523.741

†Hart, A. B., *Motions in the sun at the photospheric level, pt. 4, The equatorial rotation and possible velocity fields in the photosphere.* *Royal Astronomical Society, London, Monthly Notices*, 114(1):17-38, 1954. table, 23 refs., eqs. DWB—From spectra of the equatorial photosphere taken near the limb of the sun between 1950 October and 1952 June, 480 determinations of line-of-sight velocity are made. A careful investigation shows, contrary to an earlier suggestion, that the effect on velocities, of light scattered in the Earth's atmosphere and in the telescope, is negligible. In order that each day on which observations are made should carry equal weight in the final solution, only 334 of the determinations are used to find the mean equatorial velocity. After the elimination of limb effect, the velocity due to solar rotation is found to be 1.91 km sec^{-1} for the mean epoch 1951.5. The individual determinations have a large dispersion about this mean and a statistical discussion shows that the chance is less than one in a thousand that the dispersion is due to errors of measurement. It is therefore highly probable that the velocity varies from point to point in the photosphere. The extreme range in measured velocity is approximately 0.3 km sec^{-1} and successive maxima or minima of velocity appear to be separated by a distance of the order of 75,000 km. Some evidence is found for bands of constant velocity occurring perpendicular to the solar equator, but this is less certain. The existence of such velocity changes may account for discrepant rates of rotation found by earlier observers. *Subject Heading: 1. Solar photosphere.—Author's abstract.*

6.9-51

523.746:518.12

McNish, A. G. and Lincoln, J. V., *Prediction of the present sunspot cycle.* *American Geophysical Union, Transactions*, 35(5):709-710, Oct. 1954. fig., ref. MH-BH—A previously proposed method of predicting sunspot cycles which "consists of determining a 'mean' sunspot cycle by forming averages of past observations for successive years after observed sunspot minima" is described briefly and its reliability as applied to the present aging sunspot cycle is examined. A statistical analysis of observed with predicted values of the current sunspot cycle centered in Feb. was carried out. It is shown that the method has, in this case, "produced much better results than would have been obtained if 'average' values had been predicted." *Subject Headings: 1. Sunspot cycle forecasting 2. Sunspot cycles.—I.L.D.*

OCEANOGRAPHY AND MARINE METEOROLOGY

See also: *Weather ships* (Giret), 6.9-97; *German Met. Yearbook*, 6.9-100; *Wave forecasting* (Kajiwara, Urechino), 6.9-214; *Ocean currents* (Mandelbaum), 6.9-215; *Drift currents* (Stommel), 6.9-216.

6.9-52

551.461

Montgomery, R. B. (*Woods Hole Oceanogr. Inst.*), *Analysis of a Hugh M. Smith Oceanographic Section from Honolulu southward across the equator.* *Journal of Marine Research*, 13(1):67-75, Oct. 1954. 6 figs., 5 refs. Discussion p. 74. DWB—Observations from a line of stations made in February-March 1950 extending from 5°S to 21°N along meridian 158°W are analyzed, and the results are presented as distributions of sigma-t, salinity, oxygen, and phosphate in the vertical section. The method of analysis is partly new and is designed to achieve consistency among the several variables. This section is one of a number made in the central Pacific by the U. S. Fish and Wildlife Service. *Subject Headings: 1. Oceanographic sections 2. Pacific Ocean.—Author's abstract.*

6.9-53

551.465 551.506(26)

*Hela, Ilmo; Chew, Frank and Wagner, Lansing P., Some results of the Florida Current study: preliminary report on the Grand Cayman Cruise, Nov. 15, 1953 to May 15, 1954. Miami. Univ., Coral Gables. Marine Laboratory, Contract Nonr-840(01), Technical Report (unnumbered), July 1954. 36 p. 19 figs., tables, form (fold.). DWB—In the article *Further study of the velocity structure and transport of the Florida Current*. I by FRANK CHEW, the author attempts to show, without using the geostrophic equation, that when the local time change of transport of the Florida Current "is positive, the longitudinal current speed east of the current axis is higher than that west of the axis and vice versa." By means of a simplified vorticity equation it is concluded that an increasing transport in the Florida Current increases the vorticity of the current while a decreasing transport decreases its vorticity. Also a report on the Grand Cayman Cruise of the Marine Laboratory is presented. The various studies carried out, including plankton investigations, water temperature profiles and current vectors are discussed briefly and some of the observations are given in graphs and tables. *Subject Headings:* 1. Florida current 2. Ocean current vorticity 3. Grand Cayman Cruise 4. Marine meteorological data.—*I.L.D.*

6.9-54

532.593:551.465:656.

St. Denis, Manley and Pierson, Willard J., Jr., *On the motions of ships in confused seas*. Paper presented at the annual meeting of The Society of Naval Architects and Marine Engineers, N. Y., Nov. 1953. Reprint from unidentified source (*Society of Naval Architects and Marine Engineers, Transactions*, v. 61, 1953?), p. 280-357. figs., numerous foot-refs. 26 refs., eqs. DWB—An attempt, by a naval architect working in collaboration with an oceanographer, to define the motions of a ship in a confused ocean, using the new theory of communication, colored noise, random noise, power spectra in time series, etc. formulated by WEINBLUM, ST. DENIS, RICE (1945), TUKEY and HAMMING (1949), WIENER (1949) and others. The coordinate systems may be oriented with the earth, the wind direction, the direction of motion of ship or the orientation of the vessel. The Seaway is defined and the classical wave theory introduced. The results are obtained after elaborate calculations in terms of frequencies. In other words (1) the complex sea surface is defined as a sum of an infinite number of simple harmonic waves, (2) the response of the ship to a simple harmonic wave is determined and (3) the response of the ship to a sum of various independent forces, or to an energy spectrum, is worked out. Long discussions by ISELIN, DAVIDSON, GERHARD NEUMANN, TUKEY and many others are appended. *Subject Headings:* 1. Ocean wave theory 2. Power spectrum 3. Ship motions.—*M.R.*

6.9-55

551.465 551.526.

*†Sears, Mary (Woods Hole Oceanographic Inst.), *Notes on the Peruvian coastal current*. Pt. 1, *An introduction to the ecology of Pisco Bay*. *Deep-Sea Research*, London, 1(3):141-169. April 1954. 4 figs., 3 tables, bibliog. p. 165-169. DN-HO. Spanish translation as *Notas sobre la Corriente Costanera del Peru*. Pt. 1, *Introducción a la ecología de la Bahía de Pisco*. *Compañía Administradora del Guano, Lima, Boletín Científico*, 1(2):133-179, Sept. 1954. 4 figs. (fold.), 3 tables. DWB—In spite of the fact that biological "disasters" such as the disappearance of anchovies and hence the death of the guano producing birds, or the appearance of "red water" due to dense concentrations of dinoflagellates have occurred, it is shown by tabular data obtained from stations near Pisco Bay (1941) and in the vicinity of Cabo Blanco and Labitos and off Chincha Norte in 1940-42, that temperature changes (horizontal and vertical and with time) as well as salinity variations are not as extreme as those off the east coast of the U. S. and are similar to those in the Mediterranean. Disastrous temperature rises are attributed to local solar radiation and adverse biological effects to lessening of upwelling and consequent reduction in phytoplankton on which anchovies feed, and not to an incursion of "El Niño" as was formerly believed. *Subject Headings:* 1. Coastal current variations 2. Guano birds 3. Ocean temperature variations 4. Radiation effects 5. El Niño Current 6. Peruvian Coast.—*M.R.*

6.9-56

551.465:551.468 551.555.9:551.46

Shliamin, B. A., *Vliianie beregov na pribrezhnye techeniia*. [Influence of sea shores on coastal currents.] *Priroda*, Moscow, 43(9):111-113, Sept. 1954. 3 figs. DLC—The author

resses the necessity of developing accurate theoretical concepts of the role of natural factors in the regime of coastal currents. He takes up one of V. B. SHTOKMAN's deductions—on the influence of lateral non-uniformity of wind on sea currents and presents some considerations of the role of local physical and geographical factors in the building up of the system of coastal wind currents. He shows that the lateral non-uniformity of wind can be caused by the relief of the sea coast, by the configuration of the coast line (including islands) and by the distance from the shore. It is obvious that their influence will vary depending on the prevailing direction of the wind. *Subject Headings:* 1. Coastal currents 2. Sea breezes.—A.M.P.

6.9-57 551.482

*Johns Hopkins Univ. Chesapeake Bay Institute, Patuxent River winter cruise, Dec. 3-7, 1952. Its *Data Report* 23, Dec. 1954. 44 p. mostly tables. DWB—Data obtained at stations in the Patuxent River during oceanographic cruise from Dec. 3 to 7, 1952 are presented in detail. The types of data obtained (location of stations shown on map) at each station were: current speed and direction, temperature and salinity at 5 m depths to 50 m, oxygen, pH, phosphate, turbidity, chlorophyll, alkalinity, and weather, air temperature and wind. Instruments and methods of observation are described. *Subject Headings:* 1. Oceanographic cruises 2. River hydrology 3. Oceanographic data 4. Patuxent River, Maryland.—M.R.

GLACIOLOGY

See also: Glacial winds (Hoinkes), 6.9-211.

6.9-58 551.311.11:551.526

*Expéditions Polaires Françaises, *Contribution à la connaissance de l'Inlandsis du Groenland*. [Contribution to the knowledge of the Greenland Ice Cap.] Paris, 1954. 41 figs., 10 tables, 37 refs., eqs. Mimeo. Pt. 1, Holtzscherer, Jean-Jacques, *Mesures sismiques*, p. 5-26. 9 figs., 17 refs. Pt. 2, Bauer, Albert, *Synthèse glaciologique*, p. 27-56. 21 figs., 37 refs. French, English and German summaries p. 7-9 and p. 29-31. DWB—Complete scientific report, with data and illustrations, of seismic soundings made on the Inland Ice of Greenland 1948-53 by the French Polar Expedition. Cross sections of the ice in several directions are made from the results of measurements of ice thickness at about 400 points. Volume of ice, ablation, movements, density and temperature of Inland Ice down to 130 m depth are also calculated and discussed. Volume calculated at $2.6 \times 10^6 \text{ km}^3$ ice or $2.35 \times 10^6 \text{ km}^3$ of water. *Subject Headings:* 1. Greenland Ice Cap 2. Greenland ice temperature 3. Greenland ice volume 4. Glacial ablation 5. Expéditions Polaires Françaises 6. Greenland.—M.R.

6.9-59 551.311.181

Joset, Alain and Holtzscherer, Jean-Jacques, *Détermination des épaisseurs de l'Inlandsis du Groenland Ice Cap*. [Estimating the thickness of the Greenland Ice Cap.] *Annales de Géophysique*, Paris, 10(4):351-381, Oct./Dec. 1954. 23 figs., 14 tables, 17 refs. This is *Expéditions Polaires Françaises, Rapports Scientifiques, N III 2 (Sondages Sismiques au Groenland, 1949-1951)*, pt. 3. MH-BH—Detailed explosion seismograms, data and analysis thereof, for cross sections of Inland Ice at 63° to 72°N , to obtain depth and volume. Methods of observation and computation of data are described in detail. Observations were made every 20 km on numerous sections (500 in all). Cross sections show compiled depth profiles at several places. Each calculated depth is also given in table: average depth varies from 1.2 km (about 1.7 km for all sections combined) and area $1.6 \times 10^6 \text{ km}^2$ and volume $2.75 \times 10^6 \text{ km}^3$ and water content of $2.43 \times 10^6 \text{ km}^3$ or 7 m over all oceans. *Subject Headings:* 1. Greenland ice thickness 2. Greenland ice volume 3. Greenland Ice Cap 4. Greenland 5. Expéditions Polaires Françaises. I. Martin, J.—M.R.

6.9-60 551.311.12

Glen, J. W., *The creep of polycrystalline ice*. *Royal Society of London, Proceedings, Ser. A*, 228(1175):519-538, March 22, 1955. 12 figs., 3 tables, 27 refs. DWB—Specially prepared ice was subjected to pressures of 1-10 bars in a cold chamber from -13°C to melting point. The minimum observed flow rate $= B \exp(-Q/RT)\sigma^n$, where σ is the applied stress, $B = 7 \times 10^{24}/\text{yr}$, Q is 32 kcal/mole and n is about 3.2. At higher stress accelerated creep was

observed, attributed to recrystallization. Measurements in glaciers confirm the result except at low stresses. *Subject Headings:* 1. Ice mechanics 2. Glaciology.—C.E.P.B.

6.9-61

551.311.12(82)

Heinsheimer, Georg J., *Zur Hydrologie und Glaziologie des Lago Argentino und Ventisquero Moreno, Argentinien*. [On the hydrology and glaciology of Lake Argentino and the Ventisquero Moreno, Argentina.] *Zeitschrift für Gletscherkunde und Glazialgeologie*, 3(1), 24-32, Dec. 1954. 2 charts, 8 photos, table, 13 refs. Also his: *Der Durchbruch des Moreno Gletschers, Lago Argentino, Patagonien, 1953*. [The break-through of the Moreno Glacier, 1953.] *Ibid.*, 33-38. chart, 11 photos, 6 refs. German, English and Spanish summaries p. 24, 33. **DLC**—1. In summer 1952/3 the Moreno Glacier dammed part of L. Argentino raising the water level. This advance, while the Patagonian ice which supplies the narrow glacier is still receding, is attributed to ice-falls. 2. The glacier had increased in thickness by 40 m since 1900 and penetrated a forest several decades old. On March 30 and 31, 1953, the waters of L. Argentino broke through the ice dam. *Subject Headings:* 1. Glacial advance 2. Moreno Glacier, Patagonia.—C.E.P.B.

6.9-62

551.311.12(82)

*†Raffo, Jose Maria; Colqui, Benito S. and Madejski, Mariano E., *Glacier Moreno*. [Moreno Glacier.] *Meteoros*, Buenos Aires, 3(4):293-341, Oct./Dec. 1953. 32 figs., 34 refs. Spanish and English summaries p. 293. **MH-BH**—A comprehensive study analyzing the data obtained during 6 years of glaciological investigations in the years 1946-1952 on the unusual glacier in Patagonia. The Moreno Glacier has advanced for at least the last 7 years while most other glaciers have been retreating. The Moreno Glacier feeds on an extensive ice and snow mass in south central Andes, and flows into Lake Argentino at lat. 50°30' long. 73°W. Its advance has blocked off the Canal de los Témpanos, thus flooding a large area since 1939. The advance may be due to its capturing a mass of ice from the Fricción Glacier. Precipitation records are not long enough or close enough to allow conclusions to be drawn as to the relation of the precipitation to the glacial advance. The climate of the area is discussed. Excellent charts and photographs are included. *Subject Headings:* 1. Glacial advance 2. Glacial investigations 3. Moreno Glacier, Patagonia.—M.R.

AVIATION METEOROLOGY

See also: Quest for northern air route (Forbes), 6.9-14; Met. fellowship (Schwarz), 6.9-29.

6.9-63

551.551:629.1

Coleman, Thomas L.; Copp, Martin R.; Walker, Walter G. and Engel, Jerome N. (*Langley Aeronautical Lab., Langley Field, Va.*), *An analysis of accelerations, airspeeds, and gust velocities from three commercial operations of one type of medium-altitude transport airplane*. U. S. NACA, Technical Note, 3365, March 1955. 31 p. 9 figs., 4 tables, 9 refs. **DWB**—Time-history data obtained by the NACA VGH recorder from one model of a four-engine civil transport airplane during operations on three routes are analyzed to determine the magnitude and frequency of occurrence of gust velocities, gust and maneuver acceleration and the associated airspeeds. Variations of the gusts and gust accelerations with route and flight condition are indicated. Estimates of the overall gust and gust-load histories for extended operations on one route are obtained by supplementing the data from the NACA VGH recorder with available data from the NACA V-G recorder. *Subject Headings:* 1. Gust velocity analysis 2. Gust frequencies 3. Gustiness meters 4. Aeronautical meteorology.—Author abstract.

6.9-64

551.551:629.1

Coleman, Thomas L. and Walker, Walter G., *Analysis of accelerations, gust velocities and airspeeds from operations of a twin-engine transport airplane on a transcontinental route from 1950 to 1952*. U. S. NACA, Technical Note, No. 3371, Feb. 1955. 16 p. diagrs., tables. **DWB**—VGH time-history data obtained from one type of twin-engine transport airplane during operations from 1950 to 1952 on a transcontinental route are analyzed in order

to determine the magnitude and frequency of occurrence of gust accelerations, gust velocities, and the associated airspeeds and altitudes. The present results compared favorably with results previously obtained for a similar type of twin-engine airplane during other operations. The present operations indicate a less severe acceleration history than that shown for the other airplane, apparently because of the lower operating airspeed in rough air. *Subject Headings: 1. Gust frequencies 2. Gust velocity analysis 3. Aeronautical meteorology.—Authors' abstract.*

6.9-65

551.551:629.13

*Steiner, Roy (Langley Aeronautical Lab., Langley Field, Va.), **An analysis of normal accelerations and airspeeds of one type of twin-engine transport airplane in commercial operations over a northern transcontinental route.** U. S. NACA, Technical Note, 2833, Nov. 1952. 23 p. 7 figs., 4 tables, 11 refs. DWB—Normal-acceleration and airspeed data obtained for one type of twin-engine transport airplane in commercial operations over a northern transcontinental route are analyzed to determine the gust and gustload experiences of the airplane. The acceleration increments experienced equaled or exceeded the limit-gust-load factor, on the average, twice (once positive and once negative) in about 7.5×10^6 flight mi, and an effective gust velocity of 30 ft/sec was equaled or exceeded twice in about 1×10^6 flight mi. The data indicate that the maximum gusts and gust loads experienced in the winter were roughly 10% higher than those experienced in the summer on this route. *Subject Headings: 1. Gust loads 2. Gust velocity analysis 3. Aeronautical meteorology.—NACA abstract.*

6.9-66

551.551:629.13

Walker, Walter G. (Langley Aeronautical Lab., Langley Field, Va.), **Gust-load and airspeed data from one type of four-engine airplane on five routes from 1947 to 1954.** U. S. NACA, Technical Note, No. 3358, Jan. 1955. 28 p. diagrs., 4 tables. DWB—This paper presents the results of an analysis of approximately 100,000 hrs of V-G data from one type of four-engine civil transport airplane to determine the magnitude and frequency of occurrence of the gust loads and gusts. The normal accelerations differed by approximately 15% and the derived gust velocities by about 18% for the five operations investigated. The gust loads of the present operations were less than the loads experienced by other four-engine civil transports previously investigated, but the differences are not significant. The present data indicated only small differences due to seasonal effects and different operational utilization. *Subject Headings: 1. Gust velocity analysis 2. Gust loads 3. Aeronautical meteorology.—NACA abstract.*

AGRICULTURAL METEOROLOGY

See also: Micromet. of Slope Farm (Uehara), 6.9-11; Wind breaks in garden (Fuss), 6.9-217; Shelter-belts (Uhlig), 6.9-218; Locust swarms (Ramachandra Rao), 6.9-222; Monthly rainfall (Balasubramaniam), 6.9-259; Weather conditions, 6.9-300.

6.9-67

551.501.1:63(02)

Fedoseev, A. P., **O novoi instruktssii po agrometeorologicheskim nabludeniim na pastbishchakh i senokosakh.** [New instructions for agro-meteorological observations on pastures and hay meadows.] *Meteorologiya i Gidrologiya*, Leningrad. No. 1:63-65, Jan./Feb. 1955. 3 refs. DWB—The author reviews the instructions which are a revision of those first published in 1951. Various improvements are noted; especially more precise descriptions of the developmental stages of leguminous pasture plants, inclusions of hydrometeorological phenomena unfavorable to animal industry, etc. Various shortcomings of the instructions and suggestions for periodical improvements are presented. *Subject Headings: 1. Instructions for agrometeorological observers 2. Agrometeorology.—I.L.D.*

6.9-68

551.577.38:631.6

Nakahara, Magokichi; Tahara, Toraji and Nakazawa, Soichi, **Some problems on farm irrigation, pt. 1.** *Journal of Agricultural Meteorology*, Tokyo, 9(3/4):81-84, Aug. 1954. 3 figs., 3 tables. In Japanese; English summary p. 83-84. MH-BH—Even where there is enough rainfall with proper seasonal distribution, every few years a dry spell upsets nature and the

crop is lost. In such a year farm irrigation is very effective. Our experiment was made in the summer of 1953 under unfavorable weather conditions using an upland rice field at the Tokyo University of Agriculture and Technology, so as to point out the effect of farm irrigation. We did not get good results to demonstrate the effectiveness of the farm irrigation, but showed the differences of soil water content and soil constitution between the irrigated plot and the cultivated one, as shown in Fig. 3. *Subject Headings: 1. Drought periods 2. Irrigation effects 3. Tokyo, Japan.—Authors' abstract.*

6.9-69

551.524.37:633.11:

Okamoto, Kiyozumi and Izumi, Sei-ichi, **The aspect of the frost injury of wheat in the Kanto district.** *Journal of Agricultural Meteorology*, Tokyo, 9(3/4):99-100, Aug. 1954. 2 tables. In Japanese; English summary p. 100. **MH-BH**—In the north Chiba district most of the panicles were very poor and empty of grain. This was caused by air temperature below 0°C at the heading time of wheat. In the Tochigi district the heads of wheat decreased in number. This was caused by damage to panicles at the early stage of their development. *Subject Headings: 1. Frost damage to crops 2. Wheat 3. Kanto District, Japan.—Authors' abstract.*

6.9-70

551.506.2(493)

*Vandenplas, A., **Le temps en Belgique pendant l'année 1951 et ses rapports avec la production agricoles.** [Weather in Belgium during 1951 and its relation to agriculture. *Belgium. Institut Royal Météorologique, Publications, Ser. B*, No. 2, 1952. 23 p. 9 figs. 5+27 tables, foot-refs. **DWB**. First 18 pages of this article were run under same title in *Ciel et Terre*, 68(11/12):235-252, Nov./Dec. 1952 (see item 4.11-44, Nov. 1953, *MAB*). The behavior, during 1951, of the principal meteorological variables, namely wind, storms, temperature, precipitation, insolation and relative humidity is discussed with the aid of tables and isoline charts. The effect of the climatic conditions upon agriculture during 1951 is considered. Monthly mean temperature and rainfall deviations from normal, relative humidity, etc. are given for 27 weather stations in Belgium. *Subject Headings: 1. Agricultural climatology 2. Belgium.—I.L.D.*

INDUSTRIAL AND MEDICAL METEOROLOGY

See also: **Heating and ventilation** (Bedford), 6.9-1; **Wind utilization** (Cadambe), 6.9-219; **Wind energy** (Golding), 6.9-220; **Wind harnessing** (Gordon), 6.9-221.

6.9-71

551.554:551.556.3

*Frankenberger, Ernst (*Quickborn/Holstein*), **Über den Tagesgang nutzbarer Windenergie** [Daily fluctuation of effective wind energy.] *Studiengesellschaft Windkraft e.V., Stuttgart Mitteilungen*, No. 1:16-19, April 1953. 2 figs., table. **DWB**—An investigation of the dependence of available effective wind energy on the time of the day was carried out at Quickborn Holst, Germany, on the basis of observations of wind force during 1951. The mean wind force was determined for every month and every hour from hourly values which exceeded the wind force needed for operation of industrial wind installations (5.0 m/sec.). The results of the study, presented in the form of diagrams and a table, show the characteristics of the daily and annual variation of wind energy at different heights up to 80 m. *Subject Headings: 1. Wind energy 2. Diurnal wind variations 3. Wind utilization 4. Quickborn, Germany.—A.M.P.*

6.9-72

551.524:628.5

Bock, J. E. and Franklin, J. S., **Effect of temperature on fluorescent street lighting luminaires.** *Illuminating Engineering*, New York, 49(2):110-116, Feb. 1954. 8 figs., table. 6 refs. **DLC**—Fluorescent lamps, unlike other light sources used for street lighting, are affected by the ambient temperature. As a result of laboratory investigations, the authors present graphs showing relations between bulb wall temperature, ambient temperature and light output. Other meteorological factors affecting light output of fluorescent luminaires are under study (rate of change of ambient temperature, wind velocity and direction, precipitation). *Subject Heading: 1. Temperature effects on fluorescent lamps.—G.T.*

6.9-73

551.556.3:621.311.24

Dobrosedov, A. S. and Medovar, E. I., *Vetrodvigatel' TV-8.* [Windmotor TV-8.] Moscow, Mashgiz, 1951. 119 p. 40 figs., 10 tables, 5 eqs., 8 appends. p. 94-119 (mostly tables).
 DLC—A technical work on the particular type of wind-electric generator in use throughout the U.S.S.R. is preceded by a chapter on the general nature and measurement of wind and calculation of energy of the wind. *Subject Headings:* 1. Wind generators 2. U.S.S.R.—M.R.

6.9-74

551.594.14 662.2:539.1

Cockcroft, Sir John, *Radioactive pollution from nuclear explosions. Smokeless Air*, 194:192-196, Summer 1955. DWB—Average concentration of radioactivity in the air at ground level over Britain due to hydrogen bomb explosions is about 1% of average natural radioactivity, far too little for lethal or genetic effects. Other possibilities are also negligible. Radioactive by-products of atomic power stations can also be controlled. *Subject Heading:* 1. Thermonuclear explosions.—C.E.P.B.

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: Northern air route (Forbes), 6.9-14; To all ships (Soloukhin), 6.9-15; Mt. Wrangell Observ. (Korff), 6.9-18; Ben Nevis Observ. (Paton), 6.9-21; Solar radiat. networks (Drummond), 6.9-37; Met. stations, 6.9-38; Synoptic stations (U.S.W.B.), 6.9-39; Agromet. observ. (Fedoseev), 6.9-67; Forecasting methods (Forsdyke), 6.9-117; Aurora observ. (Gerson), 6.9-333.

6.9-75

551.501:551.591.1

Gavrilov, V. A., *O nekotorykh aktual'nykh voprosakh ucheniia o vidimosti.* [Some actual problems of the study of visibility.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 5:546-560, 1953. 2 figs., 4 tables, 4 refs., 10 eqs. DLC—On the basis of experimental studies of the visual perception of objects of a landscape, the author discusses the effect of the outlines of objects of a landscape upon their contrast with the background, general rules of the perception of distant objects, the numerical evaluation of the visual perception of objects, instrumental determination of the distance of visibility including photometric measurement of visibility, nephelometric apparatus, and visual photometric measurement of visibility and formulates the concept of distance of visibility. *Subject Headings:* 1. Visibility measurement 2. Visibility theory.—I.L.D.

6.9-76

551.501.1:551.508.21

Yamamoto, Gi-ichi and Sasamori, Takashi (both at Tohoku Univ.), *Measurement of atmospheric radiation. Tohoku University, Science Reports, 5th Ser., Geophysics*, 6(1):19-31, Aug. 1954. 7 figs., 3 tables, 9 refs., 6 eqs. MH-BH—A series of measurements of the unidirectional long wave radiation from each zenith angle has been carried out on clear nights at Sendai from September 1953 to March 1954 with the instrument, similar to the Linke-Fuessner type radiometer, of 14 copper-constantan elements enclosed with the cylindrical water jacket to avoid the effect of convection. A fairly good agreement was seen between the observed results and the computed ones with use of the Yamamoto radiation charts. The presence of the additional radiation, suggested by ROBINSON was examined in connection with our observations and it was shown that the additional radiation was not present in the atmosphere and that it is an apparent phenomena due to the imperfection of Robinson's method of derivation of the isothermal emissivity. It must be remarked that the above statement does not mean to underestimate the observations of ROBINSON, which ought to be reckoned among the most excellent ones. *Subject Headings:* 1. Radiation measurements 2. Nocturnal radiation 3. Radiation calculations.—Author's abstract.

6.9-77

551.501.3:551.511

Lorenz, Edward N., *A multiple-index notation for describing atmospheric transport processes. U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*,

No. 24:85-87, Nov. 1953. 4 refs., 14 eqs. *AFCRC Technical Report*, 53-35. DWB, DLC—This paper sets forth equations which are expansions of REYNOLDS (1894) $F = \bar{F} + F'$ notation where $\bar{F}$ is the mean of F over a region, and F' the anomaly (or departure of F from the mean). These equations use subscripts 0 where no mean is available, 1 where the mean is given and 2 when the anomaly is indicated. For instance STARR and WHITE's (1951) expansion (after simplification) would be $(UV)_{111} = (U_{110}V_{110})_{111} + (U_{120}V_{120})_{111} + (U_{200}V_{200})_{111}$ for flux τ of angular momentum, across latitudes whereas PRIESTLEY's (1949) expansion would be $(UV)_{111} = (U_{110}V_{110})_{111} + (U_{210}V_{210})_{111} + (U_{020}V_{020})_{111}$. The position of the symbol specifies the variable. The first subscript represents longitude, the second time and the third pressure. *Subject Heading: 1. Momentum transport.—M.R.*

6.9-78

551.501.45:551.521.13

Georgi, J., *Zur Frage der Solarkonstanten, IV. Neuberechnung durch das Astrophysikalische Observatorium 1952.* [On the solar constant, Pt. 4, New calculation by the Astrophysical Observatory 1952.] *Meteorologische Rundschau*, 7(9/10):182-184, Sept./Oct. 1954. table, 8 refs. DWB—The corrections to be applied to the solar constant values of the Astrophysical Observatory (Silver disk scale) are discussed with their historical background and a table of comparisons between different scales is given. This shows the Smithsonian 1913 scale as 1-3.6% too high, leading to the inference that the proposed new correction of +1.8% is not required. It may even be a question of *reducing* the Silver disk scale by 2.4%, but recent rocket observations have shown that there is still a large probable error (about 2%). *Subject Heading: 1. Solar constant.—C.E.P.B.*

6.9-79

551.501.45:519.241.1:551.577.21

Higashi, Akira, *A rationalized method of disposition of rain-gauges in mountainous region. Sapporo, Japan. Hokkaido Univ. Faculty of Science, Geophysical Bulletin*, 3:41-50, Dec. 1953. 5 tables, 2 figs. In Japanese; English summary p. 50. DWB—Observations of 17 stations in the mountainous area of the Chubetsu River Basin carried out in the summer of 1948 give sufficient density for estimating exactly the total precipitation by the THIESSEN method. The topographic character of rainfall in this area is analyzed statistically by means of the partial regression equation for rainfall y at a station $y = b_1x_1 + b_2x_2 + b_3x_3$ where $x_1x_2x_3$ = latitude, longitude and altitude and $b_1b_2b_3$ = partial regression coefficients. *Subject Headings: 1. Precipitation estimation 2. Topographic influences 3. Chubetsu River Basin, Japan.—From author's abstract.*

6.9-80

551.501.45:551.553.6

Holzappel, Rupert, *Zur Verwendung der 12-teiligen Rose bei der Höhenwindstatistik.* [On the application of the 12-part rose to upper wind statistics.] *Meteorologische Rundschau*, 7(1-2):19-21, Jan./Feb. 1954. 2 figs., 3 tables. DWB—Surface and upper air wind directions are reported to nearest 10°. Author shows, with examples from Berlin and Munich, that grouping into twelve 30° groups, gives resultant winds with sufficient accuracy. *Subject Heading: 1. Wind roses.—C.E.P.B.*

6.9-81

551.501.7:551.557

Knighting, E., *Upper winds over the world.* *Royal Meteorological Society, Quarterly Journal*, 80(344):239-240, April 1954. eqs. MH-BH—Criticism is made of mathematics of two papers on "Upper winds over the world (C. E. P. Brooks and others) and a method of checking accuracy of a computed wind rose is given. *Subject Heading: 1. Upper air wind computation.—C.E.P.B.*

6.9-82

551.501.7:551.515.2

Sherman, Leon (*Florida State Univ., Tallahassee*), *A proposed modification of hurricane reconnaissance procedures.* *American Meteorological Society, Bulletin*, 34(6):256-259, June 1953. 3 figs., 6 refs. MH-BH—It is suggested that airplane reconnaissance flights in hurricane areas determine the "complete hurricane," that is the hyperbolic point as well as

the storm center or point of cyclonic indraft. The relative position of the two points should give an index to movement, blocking or recurvature of the storm and whether the storm is developing or not. Observation of the rainfall pattern should also be included in flight plans and reports, since the area of heaviest rainfall should be the area of greatest addition of latent heat and energy which would be intensified by vertical motions (induced by added heat) and consequent indraft or entrainment. Concepts such as the locus of singularities (cyclonic indraft and hyperbolic points of wind field) are defined and illustrated schematically. *Subject Headings: 1. Hurricane reconnaissance procedures 2. Hyperbolic point of hurricane.—M.R.*

6.9-83

551.501.7:551.515.21

*Sherman, Leon and LaSeur, N. E., **Reconnaissance location of the "complete" tropical disturbance**. Florida. State Univ. Dept. of Meteorology, Contract AF 19(604)-753, Scientific Report No. 1, Jan. 15, 1955. 10 p. 6 figs., table, 7 refs. DWB—For various theoretical and practical reasons it is desirable that the hyperbolic point of a hurricane be located by the reconnaissance flights along the "eye." The practical difficulty of observing the wind directions in the neighborhood of such a point, where the wind speeds are low, can be eliminated through the use of smoke bombs. Probably the reconnaissance meteorologist aboard the plane should fly so as to circumnavigate the hyperbolic point rather than so as to pass over it; thus the measured wind directions are likely to correspond to winds more nearly of the order of five knots than of one and consequently the alteration of apparent wind direction due to ocean currents is likely to be kept below the limits of analysis error. Any reconnaissance meteorologist, having the general streamline pattern in mind, will find it easy to direct such a circumnavigation. *Subject Headings: 1. Hurricane reconnaissance 2. Eye of hurricane.—Authors' abstract.*

6.9-84

551.501.8:551.507.362:551.510.53

Appleton, Sir E., **Finding things out with radio and rockets**. *Advancement of Science*, London, 10:355-364, 1954. GB-MO—Good popular account of exploration of the atmosphere by balloon, radiosonde and rocket (mainly determination of temperature stratification) and of the ionosphere by radio pulses of different frequencies. Author continues with information from solar radiations and meteors, and ends with a discussion of the possibility of space travel. *Subject Headings: 1. Radio echoes 2. Rockets 3. Upper atmosphere research.—C.E.P.B.*

OBSERVATIONAL DATA

See also: **S.E. Iceland Expedit.** (King), 6.9-16; **Fla. current** (Hela), 6.9-53; **Weather in Belgium** (Vandenplas), 6.9-70; **German Met. Yearbook**, 6.9-100; **Atmosphere** (Stephens), 6.9-137.

6.9-85

551.506.1(493)

*Belgium. Institut Royal Météorologique, **Bulletin Mensuel**. [Monthly Bulletin.] First issue seen, Jan. 1928—Latest issue seen, Nov. 1954. mostly tables and charts. In French and Flemish. DWB—Nov. 1954 issue contains monthly summary of pressure, wind, thunderstorms, sunshine, temperature, humidity and precipitation conditions with accompanying isothermal and isohyetal charts of Belgium and tabular data for the above elements for various parts of Belgium plus daily values of precipitation, wind, state of sea, vapor pressure and hours of sunshine for several important stations and, finally, the solar radiation on a horizontal surface from sun, sky and sun+sky and direct solar radiation (in cal/cm²) for each day and for the month at Uccle. Normals or departures from normal are given for most elements. *Subject Headings: 1. Monthly meteorological reports 2. Monthly data bulletins 3. Solar radiation data 4. Belgium 5. Uccle, Belgium.—M.R.*

6.9-86

/ 551.506.1(66)

*Cameroons. Service Météorologique, **Resumé mensuel**, Jan. 1954. [Monthly resume, Jan. 1954.] 19 p. tables, diagrs. Mimeo. DWB—Precipitation, maximum and minimum temperature, mean temperature, humidity, vapor pressure, surface wind, evaporation, hy-

drometeors, and weather (for 39 stations), sunshine (8 stations), winds aloft (5 stations), ceiling, visibility and surface wind frequencies (4 stations), winds aloft and temperatures at 200, 1000, 2000, 3000 and 4000 m elevation, and rainfall data for 83 stations plus an isohyetal chart for Cameroun for the month are contained in this mimeographed publication. A 2-page summary of synoptic and local weather conditions during the month, as well as effects on crops, is included. *Subject Headings:* 1. Monthly data bulletins 2. Upper air data 3. Cameroun, Africa.—M.R.

6.9-87

551.506.1(713)

*Canada. Meteorological Div., *Annual Meteorological Summary, Toronto, Ontario, 1954, with comparative data [1955]*. 12 p. entirely data. DWB—This annual summary contains usual average or extreme temperatures, relative humidity, precipitation, sunshine and wind data for each month, daily maximum, minimum and normal temperature for 1954 and for entire period of record (1841-1954), degree day data, sun and sky radiation, frequency of rainfall exceeding certain amounts for 5, 10, 15, 20, 30, 60 minutes and for 24 hours, intensity of heaviest rainfalls, actual monthly and annual maximum, minimum, mean maximum, mean minimum and mean temperature, total rainfall, snowfall and precipitation for each month from 1841-1954. A variety of frequency data for temperature, rainfall, thunderstorms, etc., hours of sunshine (1882-1954), radiation (1938-54) and comparative temperature data for 25 nearby stations and finally tables of average and maximum wind speed and direction (1916-54) are given. *Subject Headings:* 1. Annual meteorological reports 2. Climatic data 3. Observational data 4. Long period records 5. Frequency data 6. Toronto, Ontario.—M.R.

6.9-88

551.506.1(866)

*Ecuador. Servicio Meteorológico, *Resúmenes anuales correspondientes a 1948-1953*. [Annual summaries covering 1948-1953.] Its *Boletín Meteorológico*, No. 4, 1954. 159 p. almost entirely tables. On t-p: Observatorio Astronómico. DWB—Hourly means and monthly totals of pressure, temperature, relative humidity, and precipitation and solar illumination and monthly means of wind directions and velocity are given for Quito for each year 1948-1953. Also incidence of frost, hail, fog, etc. is recorded. Monthly means of the various meteorological variables are presented for each year for the stations of the meteorological network. (For 1944-1947 issue, see 3.3-37, March 1952, MAB.) *Subject Headings:* 1. Annual meteorological reports 2. Meteorological observations 3. Ecuador.—I.L.D.

6.9-89

551.506.1(471.1)

*Finland. Ilmatieteellinen Keskuslaitos, *Ilmatieteelliset Havainnot Suomessa*. [Meteorological observations in Finland], v. 1, 1901-Latest issue seen, v. 38, 1939, pub. 1953. Annual. entirely tables. Title varies: 1916-1920, *Havaintotuloksia II ja III luokkaan asemilta*. [Results of observations at 2nd and 3rd-order stations.] Its *Suomen Meteorologinen Vuosikirja*, Pt. 1. DWB—As a continuation of data publications issued by the Finnish Meteorological Service since 1844 under various titles, "Ilmatieteelliset Havainnot" appears as Pt. 1 of the Finnish Central Meteorological Institute's Meteorological Yearbook. Vol. 38 contains 92 pages of tables giving values of hourly observations at Helsinki and Ilmala (pressure, temperature, rel. humidity, wind speed and direction, cloud observations, precipitation, sunshine, visibility), thrice-daily observations at 7 second-order stations, a survey of monthly and yearly values for 108 stations, and temperature means and extremes for 21 third-order stations. *Subject Headings:* 1. Observational data 2. Annual meteorological reports 3. Finland.—G.T.

6.9-90

551.506.1(471.1)

*Finland. Ilmatieteellinen Keskuslaitos, *Kuukausikatsaus Suomen sääoluihin*. [Monthly summary of weather in Finland.] 1907-1915; 1919-Latest issue seen, 48(8), Aug. 1954. Monthly. Currently 4 p. each. tables. DWB—Each four-page issue contains:

1) a table of daily means of pressure, temperature, wind direction and velocity and precipitation for 9 stations in Finland, 2) a review of weather development during the month, 3) climatological values of temperature, wind and cloudiness for 15 stations, 4) a paragraph on electrical phenomena, 5) monthly means of precipitation values for 70 stations, 6) aerological data (temperature, wind, humidity) for 4 stations and 7) a note on topics of general or current interest (in Finnish or Swedish). Legends are in Finnish and Swedish. *Subject Headings:* 1. Observational data 2. Monthly climatic summaries 3. Finland.—G.T.

6.9-91

551.506.1(43)

*Germany. Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, *Deutsches Meteorologisches Jahrbuch*, 1953, Teil 4, Heft 3, *Beobachtungen des Aerologischen Observatoriums Lindenberg*. [German Meteorological Yearbook, v. 4, pt. 3, Observations from the Lindenberg Aerological Observatory.] Berlin, Akademie-Verlag, 1954. 190 p. almost entirely tables. DWB—Complete tabulation of hourly, daily and monthly synoptic observational data for 3 times a day. Values of precipitation, sunshine, global radiation, visibility; thrice daily observations of soil temperature, soil surface temperature, and water content of snow; hourly microaerological (temperature and humidity at 0.15, 0.5, 2.0, 5, 15, 30, 60 and 76 m), and mean hourly lapse rates 0-76 m height, hourly wind speed, and hourly wind direction at 90 m. *Subject Headings:* 1. Micrometeorological data 2. Observational data 3. Annual meteorological reports 4. Lindenberg Aerological Observatory, Germany.—M.R.

6.9-92

551.506.1(410)

*Monthly Weather Report. London, v. 1, 1884—Latest issue seen, 71(9), Dec. 1, 1954. mostly tables. Subtitle: *Summary of observations compiled from returns of official stations and volunteer observers*. Issued by Great Britain. Meteorological Office. DWB—Monthly summary of synoptic and local weather conditions, temperature, precipitation, sunshine, fog and miscellaneous phenomena followed by tabular data on wind for one or two stations in each county of Scotland, England, Wales and North Ireland, and summary of means and anomalies of air and soil temperature, rain and sunshine for each district, charts of wind, pressure, cyclone movements, mean temperature, sunshine and rainfall for British Isles, and more extensive tables of usual weather elements at 500 stations, and vapor pressure, cloud, visibility and wind frequency data for 400 stations, plus night sky, solar radiation and illumination data for 1 to 3 stations. *Subject Headings:* 1. Monthly climatic summaries 2. Great Britain. I. Great Britain. Meteorological Office.—M.R.

6.9-93

551.506.1:629.13(54)

*Pakistan. Meteorological Department, *Monthly frequency tables of horizontal visibility, height of base of low cloud and surface and upper winds at pilot balloon stations*, Oct. 1949. Supplement to the *Monthly Weather Report*, Oct. 1949. 7 p. mostly tables. DWB—Contingency tables for specified elements at 12 airports in Pakistan. Pilot balloon cloud height and visibility data are for surface, and pilot balloon data only for 0.15 km, 1.0, 2.0 and 3.0 km height, divided into morning (before 0730), afternoon (12-17 h) and late night (after 0130h). Winds are to 8 directions and 4 speed groups. *Subject Headings:* 1. Airport climatic data 2. Upper air wind data 3. Monthly meteorological reports 4. Pakistan.—M.R.

6.9-94

551.506.3:551.524(71)

*Longley, Richmond W., *Mean annual temperatures and running mean temperatures for selected Canadian stations*. Canada. Meteorological Div., Cir., 2481, TEC-186, May 12, 1954. 45 p. mostly tables. Mimeo. DWB—Tables give mean annual temperature for each year for which records exist for 62 station in all parts of Canada and 10-year running means for each station, as well as for each district. Some of the records go back to 1871 (Toronto and Montreal) or 1872 (St. Johns), and most of them continue through 1952. Nine Arctic stations are included. *Subject Headings:* 1. Temperature data 2. Long period records 3. Canada.—M.R.

INSTRUMENT CARRIERS

See also: **Radio and rockets** (Appleton), 6.9-84; **Aerial sampling** (Gartrell, Carpenter), 6.9-113; **Turbulence in stratosph.** (Arnold), 6.9-203.

6.9-95

551.507.321.2:398.3:551.593

Raimond, J. J., Jr., **Vliegende schotels.** (Flying saucers.) *Hemel en Dampkring*, 53(2):21-37, Feb. 1955. 7 figs. **DLC**—A comprehensive discussion and evaluation of the problem of flying saucers is presented. Selected reports of flying saucers observed in the United States and Holland are summarized and examined critically. The report of the Defense Department of the U. S. of 1954, the books of KEYHOE of ADAMSKI and of MENZEL and the analysis of HYNEK are reviewed. Plausible explanations of the phenomenon are proposed. Photographs of weather balloons in positions suggesting the flying saucer phenomenon are presented. *Subject Headings:* 1. Flying saucers 2. Optical phenomena 3. Sounding balloons.—*I.L.D.*

6.9-96

551.507.321.2:551.593.5

Berthier, P. and Mévolhon, R., **Observation d'un ballon-sonde à l'Observatoire de Haute Provence.** [A sounding balloon observed at Haute Provence Observatory.] *L'Astronomie*, Paris, 68:416, Nov. 1954. fig. **DWB**—A mysterious phenomenon consisting of two vertical luminous bands was observed at sunset at several locations in Haute Provence, France. It was later identified as a sounding balloon reflecting the light of the setting sun, as shown in a photograph taken through a telescope. *Subject Headings:* 1. Refraction phenomena 2. Sounding balloons 3. Flying saucers 4. Haute Provence Observatory, France.—*G.T.*

6.9-97

551.507.2

Giret, André, **Les fréquences météorologiques.** [Weather ships.] *L'Astronomie*, 67:381-391, Oct. 1953. 2 illus. **DLC**—A fairly complete description of the history of marine observations, the French weather ships of the 1920's and 1930's, and the present Atlantic weather-ship program, with special emphasis on the French station occupied by 4 ships. The observational program, transmission of reports, meteorological equipment on board, personnel and special services are outlined. A vivid description of the wreck of the "Laplace" on Sept. 16, 1950 at its anchorage in La Fresnaye Bay prior to docking at Saint Malo is included. An explosion resulted in loss of the ship and 71 men including the captain and meteorologists. *Subject Headings:* 1. Weather ships 2. French weather ships 3. North Atlantic.—*M.R.*

6.9-98

551.507.362:551.510.535

Low, Ward C., **An instrument for investigation of non-linear effects of the ionosphere.** Boston Univ. Upper Atmosphere Research Laboratory, Contract AF 19(604)-757, Final Report, Oct. 31, 1954. 25 p. figs. (incl. photos), refs., eqs. **DWB**—The design and construction of two CW rocket transmitters are described. Specifications were supplied by Air Force Cambridge Research Center. The transmitters are to provide the wanted wave in an ionospheric cross-modulation experiment. A review and extension of applicable cross-modulation theory is given, including suggestions for detailed analysis methods of experimental data which may be obtained. It is suggested that the specified wanted wave frequency may be higher than desirable. The effective altitude ranges in which useful data may be expected are found to be narrow. Additional study is recommended before performance of the experiment as presently designed. *Subject Headings:* 1. Rocket instrumentation 2. Ionospheric soundings 3. Ionospheric cross modulation.—*Author's abstract.*

6.9-99

551.507.362

Elliott, G. L. and Weller, R., **Some navigation problems at a guided missile range.** *Navigation*, Los Angeles, 4(4):145-151, Dec. 1954. 4 figs., eqs. **DWB**—Discusses problems connected with the operation of guided missile ranges in general and the Point Mugu, Calif., sea test range in particular. Radio wave propagation effects, gravity anomalies, aerology and wind effects are among the problems mentioned in connection with navigational, tracking and plotting operations. *Subject Headings:* 1. Guided missile testing 2. Aerology 3. Wind effects.—*G.T.*

6.9-100

551.507.2:551.506.1(058)(261.2/3)

*Germany. Deutscher Wetterdienst, *Deutsches Meteorologisches Jahrbuch*, Britische Zone, 1952, Pt. 4, *Beobachtungen von deutschen Feuerschiffen der Nord- und Ostsee*. [German Meteorological Yearbook, British Zone, 1952, Pt. 4, Observations of the German light ships of the North and Baltic Sea.] Hamburg, Amtliche Veröffentlichungen des Deutschen Wetterdienstes, Seewetteramt, 1954. 91 p. almost entirely tables. DWB—Location of 10 lightships (2 not occupied) off the North and Baltic Coasts of Germany and headquarters to which each reports, shown on map. Data, based on observations in accordance with IMO, 1949 Code, are presented for each lightship for 4 times each day (00, 06, 12, and 18 h), for each month of the year. Five of the ships are in the North Sea and 3 in the Baltic. Monthly and annual summaries of pressure, cloudiness and air temperature (8 observations a day), sea temperature (4 times a day), wind force and frequency of speed and direction are also presented. (For Pt. 4, 1949, see item 3.7-50, July 1952, *MAB*.) *Subject Headings*: 1. Marine meteorological code—1949 2. Annual meteorological reports 3. Marine meteorological data 4. German lightships 5. North Sea 6. Baltic Sea.—*M.R.*

INSTRUMENTS

See also: Temp. measurem. and control (Chaldecott), 6.9-45; Radiat. measurem. (Yamamoto, Sasamori), 6.9-76.

6.9-101

551.508

Hay, R. F. M., Some landmarks in meteorological progress 1855-1955. Pt. 2. *Marine Observer*, 25(168):79-83, April 1955. MH-BH—This part describes progress in the design of meteorological instruments during the past century, including the barometer (and Gold slide), pressure tube anemometer, methods of measuring sea temperature, use of radar in measuring upper winds and clouds, and sferics. *Subject Heading*: 1. Meteorological instruments.—*C.E.P.B.*

6.9-102

551.508

McIlroy, I. C., The atmospheric fine structure recorder. Australia. Commonwealth Scientific and Industrial Research Organization. Div. of Meteorological Physics, Technical Paper, No. 3, 1955. 19 p. 10 figs., 4 tables, 4 refs., 10 eqs. DWB—Apparatus is described which provides recordings of the fine structure of wind, temperature, and humidity at a fixed point near the ground for subsequent analysis to determine eddy transfers and other turbulence statistics. Amongst other modifications to the original design of SWINBANK (1951 b), thermocouples have been replaced by fine platinum resistance elements for wet- and dry-bulb temperature measurement. An additional measurement, of wind azimuth, permits determination of momentum flux as well as the heat and water vapour fluxes previously obtainable. All three fluxes may now be measured simultaneously at two different points. An alternative method of determining the eddy flux of water vapour is suggested, and it is shown that under suitable conditions the covariance of vertical velocity and wet-bulb temperature provides a direct measure of total eddy heat flux (sensible and latent). *Subject Headings*: 1. Vapor pressure recorders 2. Turbulence recorders 3. Recording equipment.—*Author's abstract*.

6.9-103

551.508.2:535.245:634.94

Shipman, Robert D., Simple aid to instantaneous measurement of light intensity. *Journal of Forestry*, Wash., D. C., 52(8):605-606, Aug. 1954. photo. DWB—Light intensity is measured with a photometer or photoelectric cell, which measures the light reflected under the forest from a surface canopy, and is expressed as percent of the light reflected in full sunlight in the open. A Weston meter is mounted on a holding device above a sheet of white paper 17"×22" and 12" below the cell. This is portable and can be used at different times of the day, under different cloud and canopy conditions. It only measures light reaching the forest floor, not the crowns. *Subject Headings*: 1. Light intensities in forests 2. Photoelectric cells 3. Albedometers.—*M.R.*

6.9-104

551.508.21:551.521.1

Pastiels, Roger (*R. Belgian Met. Inst.*), **Recording the radiation of the sun.** *Instrumentation*, Philadelphia, 7(5):41-42, 1954. photos. DWB—Description of equipment installed and measurements made at the Radiation Study Department of the Royal Meteorological Institute at Uccle, Belgium. Measurements are concerned with various types of direct and indirect solar radiation, thickness of ozone layers, and climatic factors. The observation tower and its instrumentation are shown in photographs. *Subject Headings*: 1. Radiation instruments 2. Solar radiation 3. Radiation measurements 4. Uccle, Belgium.—G.T.

6.9-105

551.508.26:551.508.822

Piccard, Jean; Larsen, Harold and Blomstrand, John, **Thin-wire thermometer for radiosondes.** *Review of Scientific Instruments*, 25(10):959-963, Oct. 1954. 5 figs. DLC—It is shown that the thinner the thermometer element of a sounding balloon, the smaller the errors due to radiations from the sun and the earth. Such a thin wire thermometer made from white gold wire as described herein, was delivered March 20, 1941, to the U. S. Weather Bureau. The instrument sends off its findings by radio signals in Morse code. A very efficient vibration absorber for the instrument is described. *Subject Headings*: 1. Thermometers 2. Radiosondes.—*Author's abstract.*

6.9-106

551.508.29:551.508.71

Mellroy, I. C., **Sensitive temperature and humidity probe.** *Australian Journal of Agricultural Research*, Melbourne, 6(1):196-199, 1955. fig., 2 refs., 3 photos. DLC. Also issued as reprint by Australian Commonwealth Scientific and Industrial Research Organization.—A new instrument for the measurement of wet- and dry-bulb temperatures (and hence the calculation of humidity) which is now in use at several Australian agricultural research stations, incorporates miniature platinum resistance thermometers especially suitable for use in confined spaces or under "still air" conditions. *Subject Heading*: 1. Resistance thermometers.—*Author's abstract.*

6.9-107

551.508.29:551.586:599.9

Spangenberg, W. W., **Die Brauchbarkeit von Messungen der Körpertemperatur für bioklimatische Untersuchungen.** [The utilization of measurements of body temperature for bioclimatic investigations.] *Angewandte Meteorologie*, 2(4):119-122, Jan. 1955. fig., 5 refs. MH-BH—There are limits (of the order of $\pm 0.5^\circ\text{C}$) to the accuracy of measured body temperature in hospitals. Sources of error are discussed—instrumental, methods of measurement, and interpretation of results. *Subject Headings*: 1. Bioclimatology 2. Body temperature measurement.—C.E.P.B.

6.9-108

551.508.54

Benseman, R. F. and Hart, H. R. (*Dominion Phys. Lab., New Zealand*), **A thermocouple anemometer.** *Journal of Scientific Instruments*, 32(4):145-147, April 1955. 4 figs., 8 refs. DLC—Air is collected by a short tube placed in the airstream and passed across copper-constantan thermocouples at air temperature, over a heating grid and finally across more thermocouples. The difference in temperature is a measure of the mass of air passing through the tube. By using various sized jets the instrument can be used from 0.01 ft/s up to any desired value. It can be used for remote recording. *Subject Headings*: 1. Anemometers 2. Thermocouple anemometers.—C.E.P.B.

6.9-109

551.508.54

Rijkooft, P. J., **Comparison of wind speeds measured simultaneously by a Dines anemograph and a Robinson cup anemometer in fluctuating winds.** *Meteorological Magazine*, London, 84(995):137-140, May 1955. fig., table, 4 refs. DWB—Taking relative fluctuation b as mean amplitude over a clock hour/mean wind U_D shown by Dines anemometer, and U_P for mean velocity given by Robinson anemometer, tests at De Bilt showed that relation between U_D and U_R is given by $U_D = \alpha b + \beta$, where α increased with U_R , being negative below 5 m/s and positive above. Hence Dines instrument is greatly influenced by fluctuation. *Subject Headings*: 1. Cup anemometers 2. Dines anemograph.—C.E.P.B.

6.9-110

551.508.72:551.573

Mather, John R., Measured and computed evapotranspiration 1947-1953. *Johns Hopkins Univ. Laboratory of Climatology, Publications in Climatology*, 7(2):307-312, 1954. 2 figs., 2 tables, 5 refs. MH-BH—Brief description of an automatic and simplified evapotranspirometer. Monthly measured potential evapotranspiration (battery of five tanks) is compared with values computed according to THORNTWHAITE's formula, which consistently underestimates evapotranspiration during the winter months but gives values within 10% during the summer. *Subject Headings*: 1. Potential evapotranspiration 2. Evapotranspirometers 3. Thornthwaite's method.—A.A.

6.9-111

551.508.77

Bernard, E. A. (Yangambi, Belgian Congo), Sur les erreurs de divers types de pluviomètres dans les conditions climatologiques du Congo Belge. [On the errors of various types of rain gages in the climatic conditions of the Belgian Congo.] *Belgium. Institut Royal Colonial Belge, Bulletin des Séances*, 25(2):896-912, 1954. 6 refs., 5 tables. DWB—Very little has been written about raingage errors in tropical conditions. This article discusses errors arising from aerodynamic forces around the collar, height of gage above ground, and exposure for various types of gages (Hellmann, Minicol, Jaumotte I.R.M.I, and Poncelet I.R.M.II models) compared at Yangambi from July 26, 1948 to Dec. 13, 1950. Other errors, such as those arising from evaporation (which was found to be negligible), are discussed and vary greatly with type of gage. Although aerodynamic errors did not appear large, under varying exposure such as occurs in the Congo, errors of -10 to -15% are possible. Recommends use of Nipher shield regardless of type of gage. *Subject Headings*: 1. Rain gage errors 2. Nipher shields 3. Belgian Congo.—M.R.

6.9-112

551.508.77

Venkiteswaran, S. P.; Mani, Anna and Amritham, K. G. (Met. Off., Poona), A tipping bucket type of distant recording intensity raingauges. *Indian Journal of Meteorology and Geophysics*, Delhi, 5(3):262-266, July 1954. 2 figs., 2 tables, 6 refs. DWB—In this article the authors describe and illustrate the Sil (1945) intensity rain gage which has 3 receivers emptied cyclically every 3 min, and the Bibby intensity gage which operates on the principle of the tipping bucket, except that a contact is made for every drop which falls from the funnel orifice (about .01 mm per drop), and the pen arm rising continuously for either 1 or 3 min with chart drum turning at a specified rate. The latter type was installed at Poona and at Santa Cruz Airport, Bombay, in July, 1953. Records obtained on July 28, Aug. 24 and 29 and Sept. 4, 13 and 30 at one or other of these stations are illustrated. Heights of lines indicate intensity for any given minute; corresponding amounts recorded in syphon rain gage are also shown on recorder records. *Subject Headings*: 1. Tipping bucket rain gages 2. Rainfall intensity gages 3. Bibby rain gage 4. Sil rain gage.—M.R.

6.9-113

551.508.91:546.22:551.507.354

Gartrell, F. E. and Carpenter, S. B., Aerial sampling by helicopter: a method for study of diffusion patterns. *Journal of Meteorology*, 12(3):215-219, June 1955. 2 figs., 7 refs. DWB—SO₂ pollution by stack gases around Johnsonville plant, TVA, were made by helicopter with portable Titritog. Apparatus and procedure are described. Specimen record is shown. *Subject Headings*: 1. Atmospheric pollution measurement 2. Helicopters 3. Sulphur dioxide.—C.E.P.B.

SYNOPTIC ANALYSIS AND FORECASTING

See also: Final Report of Blue Hill Met. Obs., 6.9-2; Kerguelen Isles Mission (Jalu), 6.9-17; Report of 3rd Session (WMO), 6.9-28; Synoptic stations (U. S. W. B.), 6.9-39; Deformation fields (Emsalem), 6.9-154; Ångström's constants (Flackenberg), 6.7-176; Upper air temps. (Kumar), 6.9-192; Statistics in met., 6.9-312; Singularities (Müller-Annen), 6.9-316; Weather forecasting (Said-Ali), 6.9-328.

6.9-114

551.509.1(26)

Weather reporting in the South-West Pacific. *World Meteorological Organization, WMO Bulletin*, 3(4):141-142, Oct. 1954. table. MH-BH—Describes activities of the New Zealand

Weather Service in weather reporting from merchant ships in the vast area of the SW Pacific where land reports are scarce. The number of ship reports received from the area south of the equator from 120°W to 160°E each year increased from 4800 in 1946 to 720,000 in 1954 and 1953. This increase is partly due to efforts made by Port meteorological officers of the New Zealand Meteorological Society to gain cooperation from merchant ship officers. Twenty New Zealand ships are fully equipped for reporting and 13 are partially equipped, 540 other ships reported in 1950-53. *Subject Headings: 1. Ships weather messages 2. New Zealand Meteorological Service 3. South Pacific.—M.R.*

6.9-115

551.509.2

§*Pakistan. Meteorological Service, **Pakistan daily weather report**, May 23, 1949- Latest issue seen, Jan. 24, 1955. tables, chart. DWB, DLC—This daily weather chart contains twice daily synoptic reports from East and West Pakistan and a few places in Arabia, Afghanistan, Iran and India, grouped by regions, plus radiosonde data for Karachi and Quetta and pilot balloon data for 3 times a day for 20 stations. Two synoptic charts of the area from Arabia through Persia, Turkistan, Afghanistan, Pakistan and India to Burma for 1200 GMT the day before and 0300 GMT of the current day with insets showing maximum and minimum temperature, and departures from normal of same, and 5000 ft (1.5 km) winds over the area. In most cases actual data are entered on chart only for Pakistan and India. *Subject Headings: 1. Daily weather maps 2. Synoptic charts 3. Pakistan 4. Middle East.—M.R.*

6.9-116

551.509.

Flohn, H. (*Bad Kissingen*), **Grundsätzliche Probleme der Wettervorhersage**. [Fundamental problems of weather forecasting.] Berlin. Freie Universität. Institut für Meteorologie und Geophysik, *Meteorologische Abhandlungen*, 2(3):189-198, 1954. table, 10 refs. DWB—The various approaches to synoptic weather forecasting from V. BJERKNES, MARGULES, RICHARDSON, etc. to present day, numerical forecasting and stream flow analysis are reviewed. The limitations of present day numerical forecasting are compared with empirical forecasting. The temporal spatial restriction of numerical forecasting which includes microsynoptic and local synoptic analysis, etc. are discussed. The need for objective mechanical analysis of three-dimensional pressure or stream flow fields as well as acceleration and simplification of all transmission means in order to improve forecasting are stressed. *Subject Headings: 1. Weather forecasting 2. Synoptic forecasting 3. Numerical forecasting 4. Forecast improvement.—I.L.D.*

6.9-117

551.509.31:551.501.

Forsdyke, A. G., **The use of thickness patterns in forecasting methods used at the Dunstable Forecasting Centre**. Berlin. Freie Universität. Institut für Meteorologie und Geophysik, *Meteorologische Abhandlungen*, 2(3):51-61, 1954. DWB—SUTCLIFFE's method of applying dynamical considerations quantitatively "to the motion of the atmosphere as represented by the surface isobaric and the upper air thickness patterns, that is to the baroclinic atmosphere" is outlined. The author discusses the significance of horizontal divergence in the atmosphere, SUTCLIFFE's development equation and the interpretation of its terms, the Coriolis term, the thermal steering term and the thermal development term, various simple models of thermal development such as the thermal trough and ridge, thermal influence and difference, the use of SUTCLIFFE's development formula in short period and extended forecasting and use of climatological thickness charts. *Subject Headings: 1. Forecasting techniques 2. Thickness patterns 3. Weather forecasting.—I.L.D.*

6.9-118

551.509.3

Gilchrist, B. (*Inst. for Advan. Study, Princeton*) and Cressman, G. P. (*U. S. Air Weather Service*), **An experiment in objective analysis**. *Tellus*, 6(4):309-318, Nov. 1954. 4 figs. 4 tables, 3 refs. MH-BH—An experiment in two-dimensional objective analysis, conducted at The Institute for Advanced Study is described. The method consists of fitting a second degree polynomial by the method of least squares to the meteorological data in a limited area around each point in a rectangular grid, and then interpolating for the height of the pressure

surface at the grid point. The results of machine computations give analyses which are comparable in quality to the subjective analysis ordinarily encountered. When used in a three-parameter atmospheric model for a numerical forecast, the objective analyses led to a more accurate forecast than carefully prepared subjective analyses did. Also a satisfactory representation of the field of vertical stability (over North America) was obtained by the two-dimensional analyses, made for three different pressure surfaces. The greatest obstacle encountered in producing a completely objective analysis arises from errors of computation and transmission of raw meteorological data. This obstacle has not been overcome, and necessitates a preliminary objective examination of the data for detection of errors. *Subject Headings:* 1. Objective weather map analysis 2. Synoptic analysis 3. Numerical forecasting. —*Author's abstract.*

6.9-119

551.509.311:551.515.1

Hurley, John C. (*U. S. W. B., Airport Station, St. Louis*), **Statistics on the movement and deepening of cyclones in the Middle West.** *Monthly Weather Review*, 82(5):116-122, May 1954. 10 figs., 5 refs. **MH-BH**—The author attempts to evaluate some of the forecasting rules relating to the interdependence of cyclone intensity, direction of movement and speed. The direction taken by various cyclones was correlated "with: (1) the initial pressure of the cyclone center; (2) the 12-hour change in central pressure; and (3) the distance moved in the subsequent 12 hours." Also the distance cyclones moved in 12 hours was compared with the 12-hour change in central pressure and with the initial pressure of the low center. Special attention was given "to the rules concerning the tendency of cyclones to intensify when moving to the left of a normal course" and to decrease or fill when moving south or southeast. *Subject Headings:* 1. Cyclone deepening 2. Cyclone movement 3. Cyclone forecasting 4. Middle West, United States.—*I.L.D.*

6.9-120

551.509.312 · 551.515:551.542

Eliassen, Arnt, **Provisional report on calculation of spatial covariance and autocorrelation of the pressure field.** *Norske Videnskaps-Akademi i Oslo. Institutt for Vaer- og Klimaforskning, Report*, No. 5, 1954. 11 p. 5 tables, 32 eqs. **DWB**—For use in numerical prediction, values of $\bar{Z}$ (mean height of pressure surface), N (variance in dekameters), M (covariance with respect to Liverpool) and R (autocorrelation function with respect to Liverpool) for 1000, 700, 500 and 300 mb surfaces for 15 stations in NW Europe (British Isles, Jan Mayen, 2 weather ships J and M, etc.) for Dec. and Jan. for 6 years 1948-54 are calculated and presented in tables with ample discussion. Variance (N) increases with height, especially in southern British Isles. Distortion in R from concentric increases with height and distance from Liverpool (especially toward west). No negative values of R were obtained. *Subject Headings:* 1. Variance in pressure field 2. Upper air correlation 3. Numerical forecasting tools 4. Great Britain 5. North Atlantic.—*M.R.*

6.9-121

551.509.312:551.509.25

Prebaratics: their preparation and interpretation. *Meteorological Magazine*, London, 84(995):148-153, May 1955. 6 refs. **DWB**—P. F. ILLSLEY opened the discussion with an account of the methods employed at Dunstable for preparing forecast surface charts (prebaratics). Approaches are the use of thickness charts by SUTCLIFFE's method and ROSSBY's formula for movement of a train of waves; frontal developments are also discussed. Interpretation of prebaratics in terms of precipitation is considered. The discussion mainly centered on the value of prebaratics prepared at the Central Office to outstation forecasters; most speakers regarded them as essential. *Subject Headings:* 1. Prebaratics 2. Prognostic charts.—*C.E.P.B.*

6.9-122

551.509.5:551.515

§*George, Joseph J. et al., **Further studies on the relation between upper level flow and surface meteorological processes.** Eastern Air Lines, Inc., Contract AF 19(122)-468, Scientific Report, No. 2, June 1954. 141 p. 79 figs., 4 appends., refs. p. 140-141. **MH-BH**—This report consists of a group of objective forecasting papers aimed at forecasting position of cyclones in the United States west of 95° long. and east of 95° long., respectively, under SW

flow, 30 hrs in advance; and for forecasting movement and shape of anticyclones, warm fronts, pre-frontal line squalls, etc. 13 hrs or more in advance. The individual papers are: SHAFER, R. J. and FUNKE, P. W., *Cyclones under southwest flow, west of the 95th meridian*, p. 7-35; SHAFER, R. J. and FUNKE, P. W., *Category IV, cyclones under southwest flow, east of 95th meridian*, p. 35-47; VISSCHER, H. B., *Movement of polar anticyclones in the North American Area*, p. 48-72; WHITING, R. M., *A synoptic approach to the trigger mechanism of pre-frontal line squalls*, p. 73-88; ROCHE, R. D., *Warm frontal analysis and movement*, p. 89-116. *Subject Headings*: 1. Objective forecasting 2. Cyclone movement 3. United States. I. Eastern Air Lines, Inc. II. Contract AF 19(122)-468.—*M.R.*

6.9-123

551.509.5:551.579

*U. S. Corps of Engineers, *Coastal winter-flow index method of forecasting seasonal runoff from Columbia River near The Dalles, Oregon*. Its *Snow Investigations, Research Note*, No. 23, Sept. 30, 1954. 17 p. 2 plates, 8 tables (1 fold.), 7 refs. *DWB*—An index method for forecasting seasonal (April-through-September) runoff for Columbia River near The Dalles, Oregon, is presented, based primarily on the relation between the coastal winter runoff of four relatively low-elevation drainages in Western Oregon and Washington, and the spring snow-melt runoff of the Columbia River. Indexes of winter temperature and spring precipitation are included in the forecasting procedure as secondary parameters. A general discussion of the use of coastal winter runoff for sampling total atmospheric moisture supply in the zone of the prevailing westerly air flow is presented, and its usefulness as a forecasting tool for evaluating seasonal snowmelt runoff from adjacent high elevation areas is demonstrated. The standard errors of estimate of forecasts of April-through-September runoff for Columbia River near The Dalles, based on the procedure, range from 10.1 million acre-feet for 1 March forecasts to 5.0 million acre-feet for 1 July forecasts. The average seasonal runoff is 91.1 million acre-feet, and the standard deviation of runoff is 19.2 million acre-feet for the period of study. A comparison of reliability of forecasts with other index procedures shows it to be as accurate with regard to historical data as those in common use based on precipitation and snow course data. *Subject Headings*: 1. Runoff forecasting 2. Snow melt runoff 3. The Dalles, Oregon.—*Author's abstract.*

6.9-124

551.509.54

§Kuhn, P. M. (*U. S. W. B., Wash., D. C.*), *A generalized study of precipitation forecasting, Pt. 2, A graphical computation of precipitation*. *Monthly Weather Review*, 81(8):222-232, Aug. 1953. 14 figs., 5 tables, 6 refs. *MH-BH*—A graphical technique for estimating areal precipitation patterns associated with given contemporary charts of streamlines and isotachs and of moisture at four selected levels is developed from the basic physical consideration presented by THOMPSON and COLLINS [1]. Procedures are described for calculating the vertical velocity at four selected levels by a kinetic method. The vertical velocities obtained are combined with a graphical solution of Fulk's formula for the rate of precipitation from pseudo-adiabatically ascending air and a method is derived for calculating the 12-hour rate of precipitation. An areal comparison is made of computed and observed precipitation. (For Pt. 1, see 5.11-57, Nov. 1954, *MAB.*) *Subject Headings*: 1. Precipitation forecasting 2. Areal precipitation patterns 3. Graphical presentation.—*Author's abstract.*

6.9-125

551.509.54:551.558:551.511

§Collins, G. O. and Kuhn, P. M. (*U. S. W. B.*), *A generalized study of precipitation forecasting, Pt. 3, Computation of precipitation resulting from vertical velocities deduced from vorticity changes*. *Monthly Weather Review*, 82(7):173-182, July 1954. 12 figs., table, 7 refs., 6 eqs. *MH-BH*—The vorticity equation, simplified to neglect frictional influences and the turning of the vortex lines, is used to compute vertical velocities from changes in two successive geopotential fields. Vertical velocities over 12-hour periods were computed for 850, 700 and 500 mb levels for the period of Jan. 2-7, 1953 and the amount of precipitation resulting in a 12-hr period was calculated by means of the equation of THOMPSON and COLLINS. The observed and computed precipitation is shown on charts and in a table. *Subject Headings*: 1. Vorticity equations 2. Vorticity velocity 3. Precipitation forecasting.—*I.L.D.*

6.9-126

551.509.58:632.187:634.94

Reichelderfer, Francis W. (*Chief, U. S. W. B.*), **United States Weather Bureau service the tree grower.** [Paper presented at the] Western Forestry and Conservation Association, Seattle, Dec. 10, 1953. 9 p. Typescript. **DWB**—General remarks on the Weather Bureau service for forest protection (Fire Weather Service) which began in 1916 (specialists were assigned to western forest areas in 1924) and has expanded to date; but with particular reference to the type of service which could be required for tree production (highly specialized micrometeorological forecasting) and the prospect that such a service might be realized in the future, though not possible at present. *Subject Headings:* 1. Fire weather service 2. Forest production weather forecasting 3. Fire weather forecasting 4. U. S. Weather Bureau.—*M.R.*

6.9-127

551.509.58:632.187:551.577

Schroeder, Mark J., (*U. S. W. B., Distr. Forecast Center, Chicago*), **Verification of "probability" fire-weather forecasts.** *Monthly Weather Review*, 82(9):257-260, Sept. 1954. 6 tables, refs. **MH-BH**—Probability terms, especially in relation to precipitation occurrence, were incorporated in fire-weather forecasts on a trial basis in the Chicago District during the 1952 fire-weather seasons. These forecasts were verified in an attempt to determine whether or not such subjective estimates of probability were feasible. Results show that forecasters have some skill in assessing the probability of the occurrence of precipitation, especially for the first 30 hours. *Subject Headings:* 1. Fire weather forecasting 2. Precipitation probability Forecast verification 4. Chicago, Ill.—*Author's abstract.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

STRUCTURE OF THE ATMOSPHERE

6.9-128

551.510.41:551.511

Chapman, Sydney, **The molecular diffusive rate of change of composition in the atmosphere.** *Journal of Meteorology*, 12(2):111-116, April 1955. 3 figs., table, 10 refs., eqs. **WB**—The rate of change due to diffusion is calculated up to 80 km on the basis of the rocket temperatures at White Sands in the absence of convective mixing. An atmosphere of 21% O₂ and 79% N₂ is first considered, and the calculations then extended to He, Ne and A. "It is inferred that if convection suddenly ceased throughout the atmosphere, at the outset the O₂ concentration would increase, and the He concentration would decrease at about 80 km. The rates of enrichment or depletion even at this level, however, are so small, compared to the total density there, that a period of many months at rest would be needed to bring about appreciable changes of composition." *Subject Heading:* 1. Atmospheric diffusion.—*C.E.P.B.*

6.9-129

551.510.41:551.464:546.264

Dingle, A. Nelson (*Univ. of Michigan, Ann Arbor, Mich.*), **The carbon dioxide exchange between the North Atlantic Ocean and the atmosphere.** *Tellus*, 6(4):342-350, Nov. 1954. 3 figs., 15 refs., eqs. **MH-BH**—An approximate distribution of carbon dioxide exchange between the atmosphere and the North Atlantic Ocean is obtained for each month of the year on the basis of oceanographic data from Böhnecke's Atlas and the assumption that atmospheric carbon dioxide maintains uniformly the volume percentage of .03. The results indicate the direction in which such an even volume percentage must be changed to approach equilibrium. Aside from other influences, the ocean-atmosphere exchange of carbon dioxide and the trajectories of tropospheric air masses combine to produce high carbon dioxide content in mT and cP air and low carbon dioxide content in mP air. Since water vapor is at a minimum in the continental polar anticyclones during the polar night, the carbon dioxide probably serves as an effective inhibitor of the outgoing infrared radiation. This inhibiting effect may well serve to limit the intensity of cooling during an ice age; it probably had much less significance during inter-glacial periods. *Subject Headings:* 1. Carbon dioxide exchange ocean-atmosphere Air masses 3. North Atlantic Ocean.—*Author's abstract.*

6.9-130

551.510.41:551.578.11:546

Emanuelsson, A. (*Royal Agric. Coll., Uppsala*); Eriksson, E. (*Univ. of Stockholm*) and Egnér, H. (*Royal Agric. College, Uppsala*), **Composition of atmospheric precipitation in Sweden**. *Tellus*, 6(3):261-267, Aug. 1954. 12 figs., 6 refs., eqs. **MH-BH**—Preliminary charts are presented based on two years of data, to demonstrate the geographic distribution over Sweden of the annual amounts of Na, Cl, K, Ca, $\text{NH}_3\text{-N}$ and $\text{NO}_3\text{-N}$ brought to the surface of the earth by precipitation. The ratios of these total amounts to the total amounts of Na deposited during the same time interval are shown to possess systematic geographic distribution patterns. Comparisons are made between these ratios and the corresponding quantities in sea water. The investigation is now being resumed to provide additional data from a larger number of stations and for longer time periods. *Subject Headings: 1. Chemical composition of rainwater 2. Geographic distribution of chemicals 3. Sweden.—Authors' abstract.*

6.9-131

551.510.41:546.214:551.515.4

Vassy, Arlette, **Relations entre l'ozone atmosphérique et les orages**. [Relation between atmospheric ozone and thunderstorm activity.] *Académie des Sciences, Paris, Comptes Rendus*, 239(20):1309-1311, Nov. 15, 1954. 3 refs. **DWB**—A continuous record of ozone concentration near the ground was compared with a continuous record obtained with a thunderstorm discharge meter. The comparison reveals an increase in ozone concentration during thunderstorms. The records show that the sudden increase in ozone concentration always precedes the first thunderstorm discharges, the lag being $3\frac{1}{2}$ hours on the average. *Subject Headings: 1. Ozone concentration 2. Thunderstorm activity 3. Ozone-thunderstorm relationships.—Trans. of Author's abstract.*

ATMOSPHERIC POLLUTION

See also: **Heating and ventilation** (Bedford), 6.9-1; **Atmos. diffusion** (Gifford), 6.9-205; **Muddy rain and red snow** (Capello), 6.9-271.

6.9-132

551.510.42:551.55

Crozier, W. D. and Seely, Ben K. (*New Mexico Inst. of Mining and Tech.*), **Concentration distributions in aerosol plumes three to twenty-two miles from a point source**. *American Geophysical Union, Transactions*, 36(1):42-52, Feb. 1955. 7 figs., 5 tables, 4 refs., 5 eqs. **MH-BH**—Analyses of particle distributions in 15 cross sections of experimental aerosol plumes each from a point source at ground level, indicated that the horizontal distribution of particle concentration was expressed fairly well by $C = C_m \exp(-By^n)$. Here C_m , B , and n are parameters and y is the distance from the center of the plume, measured horizontally in either direction in the plane of the cross section. The equation was applied in two ways: in one the concentration C is the average along a vertical line the height of the plume, and in the other it gives the concentrations met on the average along single horizontal passes through the plume. Meandering of the plume has an important effect in the first case; crosswise wind shear is important in both cases. *Subject Heading: 1. Smoke plumes.—Authors' abstract.*

6.9-133

551.510.42:63:546:5

Khachatryan, M. K., **Nakoplenie svintsy v organizme podopytnykh zhivotnykh v svyazi s zagriazneniem atmosfernogo vozdukh.** [Lead accumulation in the organism of experimental animals in relation to air contamination.] *Gigiena i Sanitariia*, Moscow, No. 1:12-16, Jan. 1955. 5 tables, 7 refs. **DLC**—Data are presented on the concentration of heavy metal in the atmosphere and soil in the vicinity of plants using non-ferrous metals, and on the accumulation of lead in the tissues (bone, liver, muscle) of experimental animals located at various distances from the plants. *Subject Headings: 1. Atmospheric pollution 2. Soil pollution 3. Chemical injuries to animals.—I.L.D.*

6.9-134

551.510.4

Meetham, A. R., **Know your fog**. *Weather*, 10(4):103-105, April 1955. 3 refs. **DWB**—A study of the radiation and chemical balances of the London fog of Dec. 1952. Heat was received over an area of 450 sq mi from combustion of 70,000 tons of coal—520,000 million kcal per day; from 8 million humans, 10,000 million; from warm ground 110,000 million—

all this was lost by radiation. Smoke entered the atmosphere at 1000 tons per day and its average free life was 10 hr. Sulphur dioxide entered at 2000 tons per day and its free life was $4\frac{1}{2}$ hours. Sulphuric acid, halogens and oxides of carbon are also considered. *Subject Headings: 1. Atmospheric pollution 2. Fog, London (1952).—C.E.P.B.*

6.9-135

551.510.42:551.593.653

Sen Gupta, Prabhat K. (*Met. Off., New Delhi*), **Periodic influx of interplanetary dust particles into the terrestrial atmosphere.** *Indian Journal of Meteorology and Geophysics*, Delhi, 5 (3):272-276, July 1954. 17 refs. MH-BH—In this paper a brief account is at first given of some available evidences on the influx of interplanetary dust particles into the terrestrial atmosphere, viz., presence of sodium at high altitudes, appearance of noctilucent clouds, pitting of polished surfaces during high altitude rocket flights, high nickel content in deep sea sediments and periodic occurrence of heavy rainfall in association with meteor showers. These dust particles have sizes of the same order as of those which account for the outer corona of the sun, but terrestrial evidences suggest a higher concentration in the vicinity of the earth. Discussing the processes which are responsible for the high concentration of dust particles, it has been suggested that solar corpuscular streams push interplanetary dust particles towards the earth by repeated impacts. This mechanism is expected to give rise to an accumulation of dust particles near the earth, as well as in the plane of ecliptic. *Subject Headings: 1. Interplanetary matter 2. Noctilucent clouds 3. Meteor showers.—Author's abstract.*

6.9-136

551.510.42:551.556.4:581.12

Wiseman, Richard D.; Sack, S., Sr.; Sigel, Bernard B. (*Brooklyn, N. Y.*); Glazer, Israel and Walzer, Matthew, **Studies on factors influencing ragweed pollen counts in the New York Metropolitan District. I. Pollen studies on Ambrose Lightship in New York Harbor District.** *Journal of Allergy*, St. Louis, Mo., 25 (1):1-11, Jan. 1954. 5 figs., 11 refs. DLC—Using the standard gravity slide technique adopted by the American Academy of Allergy, ragweed pollen counts were made at nine land stations in and near New York City, and on Ambrose Lightship during the ragweed seasons of 1949 and 1950. The Ambrose Lightship counts are found to be somewhat but not greatly less than those obtained at the landbased stations. It is concluded that wind direction and speed are the most important determinants of ragweed pollen concentrations at the Lightship which has no pollen source itself, and that, as a consequence, local ragweed eradication is more or less futile because a large share of the City's pollen pollution comes on the wind from areas outside the city. *Subject Headings: 1. Wind effects on pollen counts 2. Ragweed pollen count 3. New York City.—N. A. Dingle.*

UPPER ATMOSPHERE—IONOSPHERE

See also: Max Planck Inst., 6.9-33; Radio and rockets (Appleton), 6.9-84; Rocket instrumentation (Low), 6.9-98.

6.9-137

551.510.5 551.506.7

†Stephens, Everett D., **The atmosphere: a review.** *U. S. Wright Air Development Center, Technical Note*, WCRR 52-16, Oct. 1952. 25 p. charts (some fold.), table, 65 refs. DWB—A review of the data on the atmosphere, especially the upper atmosphere up to 120 km. The information summarized included the atmospheric models for describing atmospheric conditions above the F2 layer, an outline of method used for studying the atmosphere, the composition, the temperature, pressure and distribution. The author concludes that the available data do not warrant a revision of the tentative reference atmosphere (NACA data) for use in comparative performance of flight propulsion systems. The various atmospheric properties are illustrated graphically. *Subject Headings: 1. Upper air data 2. Upper atmosphere composition 3. NACA standard atmosphere.—I.L.D.*

6.9-138

551.510.53:551.547

*de Lisle, J. F., **Specification of atmospheric variables in the vertical for two-parameter models in the New Zealand region.** *New Zealand. Meteorological Service, Technical Note*, No. 113, 1954. 6 p. 2 tables, figs., 4 refs. DWB—Upper air data from Nandi, Auckland and Invercargill for July 1953 have been used to calculate a function of pressure, $A(p)$, specify-

ing variations of contour, height, temperature and wind, with pressure for two-parameter atmospheric models. It is shown that a mean value of $A(p)$ cannot be used for the three stations because of the error introduced in the tropics. *Subject Headings: 1. Atmospheric models 2. New Zealand.—Author's abstract.*

6.9-139

551.510.53

Johansen, Harald, Variations in the total amount of ozone over Tromsø, and their correlations with other meteorological elements. *Geofysiske Publikasjoner*, Oslo, 19(5), 1954, 19 p. 9 figs., 6 tables, 21 refs. Price: 3.50 Kr. **DLC, DWB**—Simultaneous upper air and ozone observations made at Tromsø during the period May 1941–Oct. 1944 are analyzed statistically. This study deals with the following: correlation between the total amount of ozone and (1) the height of the tropopause, correlation, (2) the temperature in the upper atmosphere and the lower stratosphere, (3) temperature, potential temperature and pressure at various levels of the atmosphere; causes of day-to-day variations of the total amount of ozone; and ozone variations in relation to fronts and air masses. *Subject Headings: 1. Ozone variations 2. Ozone correlations 3. Tromsø, Norway.—I.L.D.*

6.9-140

551.510.534:551.524.7:546.21

†Khalek, Abdul (*Lab. de Physique de l'Atmosphère*), Variation diurne et annuelle de l'épaisseur réduite et de la température moyenne de l'ozone atmosphérique à Kaboul. [Daily and annual variation of the reduced thickness and of the mean temperature of the atmospheric ozone at Kabul (Afghanistan).] *Journal Scientifique de la Météorologie*, Paris, 6(23):85–111, July/Sept. 1954. 16 figs., 9 tables, 32 refs., eqs. Issued also as his Thesis (Dr.Sci.)—Paris Université, May 17, 1954. 73 p. 9 tables, eqs., graphs, biblio. p. 70–72. **DWB**—A thorough study of a year of data on ozone depth, ozone layer temperature, and the diurnal and seasonal as well as air mass variations therein. A double prism quartz spectrograph furnished by M. and Mme. VASSY and with plates sensitive in the region 5790 Å was used to obtain spectra from which the reduced O₃ thickness at Kabul could be calculated for each month; by taking 40 or more spectra each day (every 10 min) on favorable days the diurnal as well as the seasonal variations could be calculated also. A maximum at each equinox and minimum in summer (also a minimum at noon in summer) was discovered and is explained on the basis of photochemical theory. Comparison is made with seasonal curves for other places in low latitudes. Sharp seasonal variations characterize Kabul data, whereas at Kodaikanal, India (10°N) only slight seasonal variation appears. *Subject Headings: 1. Ozone observations 2. Ozone layer temperatures 3. Kabul, Afghanistan.—M.R.*

6.9-141

551.510.53

Miyake, Y. and Kawamura, K. (*Met. Res. Inst., Japan*), Studies on atmospheric ozone at Tokyo. *Meteorological Society of Japan, Journal*, 2nd Ser., 32(4):96–110, April 1954. In Japanese; English summary p. 96. 8 figs., 2 tables, 24 refs. Also in: *Papers in Meteorology and Geophysics*, Tokyo, 5(2):178–181, Sept. 1954. **MH-BH**—The amount of atmospheric ozone was measured at Tokyo during the period Jan. 1951–Sept. 1952, using a chromium photo-electric tube and glass filters (R. STAIR's method). According to results of these observations the amount of atmospheric ozone shows a marked seasonal variation with a maximum in late spring (about 0.28 cm) and a minimum in fall (about 0.22 cm). This agrees fairly well with the results obtained by other observers in similar latitudes. Relations between variations of ozone amount and meteorological factors, such as atmospheric pressure, temperature, wind direction and vertical motion, are analyzed. *Subject Headings: 1. Ozone measurement techniques 2. Ozone variations 3. Tokyo, Japan.—From authors' abstract.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: Symposium on Turbulence (U. S. Navy), 6.9-4; Atmos. transport (Lorenz), 6.9-77; Precip. forecasting (Collins, Kuhn), 6.9-125; Atmos. diffusion (Chapman), 6.9-128; Heat balance (Lake), 6.9-188; Water vapor transport (Benton), 6.9-228.

6.9-142

551.511:551.515

§Beebe, Robert G. and Bates, Ferdinand C. (*U. S. W. B. Airport Sta., Kansas City*) A mechanism for assisting in the release of convective instability. *Monthly Weather Review*

83(1):1-10, Jan. 1955. 13 figs., 16 refs., 10 eqs. DWB—A model is proposed as one means whereby an air mass characterized by the "typical" tornado sounding is converted to one described by the type of sounding observed in the vicinity of a tornado. By considering certain indications of the vorticity equation, it is possible to analyze configuration of jet axes and jet maxima such that low-level (850 mb) convergence is surmounted by higher-level (500 mb) divergence. Thus a model of jet structures is described which assists in, or possibly in some cases effects, the release of convective instability through vertical stretching or lifting. An example is presented to illustrate the use of this model in tornado forecasting and methods of application are outlined. *Subject Headings: 1. Convergence and divergence 2. Instability 3. Tornado dynamics.—Authors' abstract.*

6.9-143

551.511

Bernasconi, Carlo (*Univ. of Genova*), **Moto di un vortice sulla terra e sua influenza sulla polodia.** [Displacement of a vortex over the earth and its effect on the earth's rotation.] *Geofisica Pura e Applicata*, 28:190-198, 1954. Italian and English summaries p. 190. 5 refs., 15 eqs. MH-BH—Supposing the earth to be surrounded by a veil of an incompressible perfect fluid rotationally moved by a point shaped double vortex, the author calculates the total kinetic energy of the system as a function of the Eulerian angles θ , φ , ψ which express the earth motion referred to an inertial term, and of the angles θ_0 , ψ_0 for the vortex motion referred to the earth. He determines the above angles as temporal functions by means of the equations of LAGRANGE. The result is that the vortex motion is determined by $\theta_0 = \text{const.}$, $\psi_0 = \text{const.}$ and that its influence on the rate of rotation of the earth is negligible. *Subject Headings: 1. Vorticity theory 2. Rotation of the earth.—Author's abstract.*

6.9-144

551.511

Fleury, Jules, **La réalité de "l'effet de puits" en convection naturelle.** [The existence of a "well effect" in natural convection.] *Académie des Sciences, Paris, Comptes Rendus*, 239(19):1185-1187, Nov. 8, 1954. fig., ref. DWB—The mode of thermal exchange between a Dewar vessel containing, but not filled with, mercury and the surrounding air, largely depends on whether the mercury temperature is above or below the ambient temperature. This phenomenon, reported earlier by P. VERNOTTE, is easily explained by the stabilizing effect of the cool air over cold mercury. The validity of this thesis was verified in extensive laboratory measurements as reported in this note. However, this "well effect," which modifies natural convection, was found to take place only if the depth of the cool air is at least twice the vessel's diameter. *Subject Headings: 1. Convection 2. Heat exchange.—G.T.*

6.9-145

551.511:551.558.29

Hutchings, J. W. and Farkas, Edith, **Vertical eddy-flux of angular momentum at Nandi, Fiji.** *New Zealand. Meteorological Service, Technical Note*, No. 103, Sept. 25, 1953. 1 p. DWB—An attempt has been made to determine the probable directions of the vertical eddy-flux of angular momentum in a zone of predominantly easterly winds. The results are inconclusive but make it probable that average vertical circulations rather than eddy motions must be held responsible for most of the vertical transport of momentum in these latitudes. *Subject Headings: 1. Angular momentum flux 2. Vertical eddy flux 3. Nandi, Fiji.—Authors' abstract.*

6.9-146

551.511:551.521

Kaplan, Lewis D. (*U. S. W. B., Wash., D. C.*), **Some difficulties to be resolved for the solution of the atmospheric radiation transfer problem by high speed computers.** Sept. 1952. 12 p. eqs. Mimeo. DWB—Although high speed computers seem to be the only accurate means for the determination of radiation transfer due to thousands of absorption lines, the more urgent problem at present is the determination of the basic constants involved, as line-widths and line-shapes for CO_2 , H_2O , O_3 and their dependence on pressure and temperature. *Subject Headings: 1. Radiative transfer 2. Electronic computers 3. Atmospheric absorption bands. I. U. S. Weather Bureau.—A.A.*

6.9-147

551.511:551.52

†Plass, Gilbert N. and Fivel, Daniel I., **A method for the integration of the radiative-transfer equation.** *Journal of Meteorology*, 12(3):191-200, June 1955. 4 figs., 17 refs., 49 eqs. **DW**—The equations for radiative transfer are integrated exactly for a band of spectral lines which do not overlap and for an Elsasser band. The result of the two-fold integration of the absorption over frequency and over the atmospheric path can be expressed in terms of the Legendre functions. Here it is assumed that the mixing ratio is constant, that the line intensity is independent of temperature, and that the Lorentz line shape is valid. Asymptotic forms of the Legendre functions are used to obtain the solutions to the following problems from these exact results. The regions of validity of the single-line and strong-line approximations are precisely stated. It is shown that the strongest line in the band absorbs more radiation than any other line in an atmospheric layer, when the overlap of the lines can be neglected. For an Elsasser band, an expression is derived for the line strength that gives the maximum absorption in an atmospheric layer for radiation emitted either by a black body at another level or by another atmospheric layer. **Subject Heading: 1. Radiative transfer.**—*Authors' abstract.*

6.9-148

551.511:551.53

Swinbank, W. C., **An experimental study of eddy transports in the lower atmosphere Australia.** *Commonwealth Scientific and Industrial Research Organisation. Div. of Meteorological Physics, Technical Paper*, No. 2, 1955. 30 p. 14 figs., table, 5 refs., eqs. **MH-BH**—The results of an extended study of the fine structure of the lowest 100 feet of the atmosphere are presented. They comprise, among other quantities, measured values of the eddy fluxes of heat, water vapor, and momentum, and vertical gradients and standard deviations of temperature, humidity, and wind speed over a wide range of stability. The data show that the heat transfer coefficient consistently exceeds that for momentum in lapse conditions, the effect becoming more pronounced with increasing lapse rate and height above the ground. Indirect evidence is adduced to show that this is true also when heat transfer is compared with that of water vapor, while a difference between heat and momentum transfer in the opposite sense is indicated under inversion conditions. The importance of buoyancy in distinguishing the transfer of heat from that of the other two quantities is thereby established. An empirical relationship is derived between heat flux from the ground and the vertical gradients of potential temperature and horizontal wind speed. **Subject Headings: 1. Eddy transport 2. Atmospheric structure 3. Eddy flux.**—*Author's abstract.*

6.9-149

551.511

Thompson, Philip D. (*U. S. A. F. Cambridge Res. Center, Mass.*), **A note on the integration of the vorticity equation for quasi-geostrophic flow.** *Tellus*, 6(4):319-325, Nov. 1954. figs., 7 refs., 14 eqs. **MH-BH**—By the transformation of integrals arising from the solution of the "quasi-geostrophic" equations for barotropic and simple types of baroclinic flow, it is shown that the isobaric height tendency can be expressed in terms of first derivatives of the heights of isobaric surfaces. This demonstrates that the procedure by which the equations are solved must tend to cancel or "average out" the large percentage errors in the geostrophic vorticity advection—i.e., errors in second and third order finite-differences. The height tendency may be computed by a simple graphical procedure, which is carried out directly on analyzed contour charts and which involves a minimum of multiplications. **Subject Headings: 1. Vorticity equations 2. Geostrophic vorticity advection.**—*Author's abstract.*

6.9-150

551.511:551.551

White, Robert M. (*U. S. A. F., GRD, Cambridge, Mass.*), **The counter-gradient flux of sensible heat in the lower stratosphere.** *Tellus*, 6(2):177-179, May 1954. table, 7 refs. **MH-BH**—The author attempts to determine whether the transfer of sensible heat can be maintained by counter gradients or the systematic organization of the large scale eddy momentum exchange processes so that momentum flows from regions of lower to those of high momentum. The large scale horizontal eddy flux of sensible heat was calculated. A table gives the mean temperature magnitude of the eddy transfer of sensible heat and the total number of observations entering the evaluation. The table indicates that "throughout the troposphere, at all latitudes up to the 200 mb level the eddy flux of sensible heat is poleward from regions

f low temperature"; at above this level "there is an eddy flux of sensible heat from the cold tropical lower stratosphere poleward to the warm polar regions at these levels." The meteorological implication of the counter gradient eddy transfer processes are discussed. *Subject Heading: 1. Eddy advection of heat.—I.L.D.*

GENERAL CIRCULATION

See also: Zonal wind (Haurwitz), 6.9-223; Precip. trends (Dingle), 6.9-256.

6.9-151

551.513:551.551:551.557:629.13

§Durward, J. and Jones, D. C. E., **Weather phenomena at high levels.** *Aeroplane*, 88: 8-21, Jan. 7, 1955. 4 figs., 15 refs. DLC—Describes winds in the upper atmosphere, and aeronautical applications such as equivalent head-winds. Jet streams are dealt with at length, including specific examples with synoptic charts and cross sections. Investigation of clear air turbulence up to 50,000 ft is described. A good deal of recent British research is summarized. *Subject Headings: 1. Aviation meteorology 2. Clear air turbulence 3. Jet stream.—C.E.P.B.*

6.9-152

551.513

Maede, H., **Über zeitliche und örtliche Beziehungen zwischen den Komponenten der zonal- und Meridionalzirkulation in 500 mb über Mitteleuropa und den angrenzenden Gebieten.** [On relations in time and space between the components of the zonal and meridional circulation at 500 mb over Europe and neighboring regions.] *Zeitschrift für Meteorologie*, (4):111-115, April 1955. fig., table, 4 refs. DWB—The zonal (Z) and meridional (M) components of the circulation over W. and E. Atlantic, Central and E. Europe calculated from 500 mb isohypses 1949-54 were compared (by correlation ratio η) with those in central Europe 5 days later. Values of η were mostly small, rarely exceeding 0.35. For Z in central Europe with following Z η it was relatively high, but for Z in W. Atlantic it was negligible. For M with following M values of η were lower, and only significant over Europe. For M and following M η is high, especially in winter, reaching 0.5, its highest value. For interdiurnal changes η is small. *Subject Headings: 1. Atmospheric circulation anomalies 2. Correlation ratio.—C.E.P.B.*

6.9-153

551.513.1

Mook, C. P. (*U. S. W. B., Wash. Nat. Airport*), **On the normal monthly variation of blocking patterns over the North Atlantic.** *American Meteorological Society, Bulletin*, 35(8): 79-380, Oct. 1954. 3 figs., 5 refs. MH-BH—It is found that "ten sets of data in which blocking is defined on the one hand as the frequency and intensity of blocking highs at sea level and on the other hand as the spreading of the westerlies at 500 mb are parallel to a marked degree." When the monthly average zonal index in the Western Atlantic is related to the index of spread of the westerlies or index of blocking it appears that the normal charts agree in part with the proportion that the speed of the westerlies may be the stimulus initiating blocking. Indications of another mechanism relating the speed of the westerlies to blocking are suggested. *Subject Headings: 1. Blocking action 2. Waves in the westerlies 3. North Atlantic.—I.L.D.*

6.9-154

551.513.2:551.509.31

Emsalem, R., **Formules simples pour suivre la déformation en altitude des champs isobariques et isothermiques.** [Simple formulas for calculating the deformation of isobaric and isothermal fields aloft.] *La Météorologie*, Paris, 4th Ser., No. 34:145-149, April/June 1954. 4 figs., 10 eqs. French, English and Spanish summaries p. 145. MH-BH—Formulas are developed for calculating the direction, varying with altitude, of the horizontal lines of equal pressure and temperature which are considered to be rectilinear. They extend the classical geometrical constructions that are based upon the thermal wind. *Subject Headings: 1. Deformation fields 2. Synoptic forecasting 3. Isobaric analysis 4. Isothermal analysis.—Based on author's abstract.*

6.9-155

551.513.2:551.557:551.5

McIntyre, D. P., *On the barocline structure of the westerlies.* *Journal of Meteorology* 12(3):201-210, June 1955. 10 figs., 3 tables, 18 refs. DWB—The jet stream in winters 1944-48 was studied at Penzance (England) using jet stream itself as axis of reference. This was done by dividing 500 mb temperatures into 5°C groups and finding standard deviations of isobaric height distribution 700-100 mb in each group. Increasing S.D. indicates +baroclinicity. The isopleth diagram shows a sloping baroclinicity field which represents a mean frontal surface. The jet stream appears at 250 mb at -8°C with a mean of 80 m/s. The isopleth diagram was transformed into a geostrophic wind section by plotting change of height of 500 mb surface against temperature and distance between isotherms. These results were used to draw a cross section showing mean geostrophic wind and potential temperature over Penzance, 700-100 mb, for any given distance from jet stream. The results are also shown as mean baroclinicity (solenoids per unit area). *Subject Headings:* 1. Baroclinic fields 2. Jet stream analysis 3. Penzance, England.—C.E.P.B.

6.9-156

551.513.2:551.5

Palmén, E. (Helsinki), *Über die atmosphärischen Strahlströme.* [Atmospheric jet streams.] *Berlin. Freie Universität. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 2(3):35-50, 1954. 7 figs., 20 refs., 4 eqs. DWB—The author reviews some of the literature on the nature of the jet stream and points out that according to the observations of synoptic meteorology, jet streams occur primarily in the principal frontal zone in the region of the polar front, while according to climatological observations, a quasi-permanent jet flow is located in the upper troposphere subtropical zones. This contradiction is resolved when ten distinct types of jet streams are distinguished, namely very variable jet streams of the main atmospheric frontal zones and a quasi-permanent jet stream associated with the dynamics of the tropical circulation. *Subject Headings:* 1. Jet stream 2. Polar fronts 3. Tropical jet stream.—*Author's abstract.*

ATMOSPHERIC DISTURBANCES

See also: Upper atmos. research (Kaplan, others), 6.9-9; Report of 3rd Session (WMO), 6.9-28; Hurricane reconnaissance (Sherman), 6.9-82; Reconnaissance location (Sherman, LaSeur), 6.9-83; Cyclone deepening (Hurley), 6.9-119; Variance in pressure field (Eliassen), 6.9-120; Upper level flow (George, others), 6.9-122; Atmos. ozone and thunderstorm (Vassy), 6.9-131; Convective instability (Beebe, Bates), 6.9-142; Destructive winds (Hage), 6.9-209; Rain water (Miyake, Sigiura), 6.9-253.

6.9-157

551.515(742):551.553

Young, Robert C. and Howell, Wallace E., *The storm of November 7th.* *Mount Washington Observatory, News Bulletin*, No. 25:3-4, Dec. 1953. DWB—A vivid description by the observers on duty at Mt. Washington Observatory at a time when the wind reached 101 mph for an hour and gusts as high as 151 mph were recorded (1500 h Nov. 7, 1953). Rime formed on the instrument tower at a rate of 6 in. per hr and had to be knocked off by banging on the masts with a heavy iron poker. Owing to ice under foot and winds >50 mph for 24 hours and >90 mph for 6 hours, the outdoor activities of the observers were extremely difficult and hazardous. Clouds (fog) enveloped the observatory the whole time (Nov. 7-10). *Subject Headings:* 1. Wind storms 2. Extreme winds 3. Icing of instruments 4. Mt. Washington Observatory, New Hampshire.—M.R.

6.9-158

551.515

Genève, R., *L'Action du frottement sur l'évolution d'une dépression.* [Frictional action and the evolution of a depression.] *Journal Scientifique de la Météorologie*, Paris, 6(22):41-44, April/June 1954. fig., 2 refs., eqs. DWB—An attempt to determine whether depressions deepen less quickly or fill more rapidly over the continents than over the oceans, since for equal speeds the flow normal to the isobars and directed towards low pressures is greater over the former than over the latter. The procedure involved an examination of the statistical distributions of pressure variations at the center of the same closed depression during a given

time interval over the ocean and over the continent. It is found that friction plays no role in the evolution of depressions over the ocean while over the continents its effect corresponds to a filling of the order of magnitude of 1 to 2 mb per day. A comparison is made between the theoretical order of magnitude of the friction effect calculated from the equation of mass and that determined empirically. *Subject Headings:* 1. Depressions 2. Pressure variations 3. Frictional effects.—*I.L.D.*

6.9-159

551.515.2

Boughner, C. C., **Hurricane Hazel.** *Weather*, 10(6):200-205, June 1955. 2 figs DWB—The hurricane season of autumn 1954 was unusually severe along the Atlantic coast, culminating in Hazel. This appeared in E. Caribbean on Oct. 5 and, blocked by an anticyclone over N. Atlantic, travelled from N. Carolina to S. Ontario in 12 hrs on Oct. 15-16, doing great damage through wind and heavy rain. Details of flooding around Toronto are given, especially in Humber River. At Brampton 7½ in. fell in 24 hrs and over 8 in. in 48 hrs (map). *Subject Headings:* 1. Hurricane "Hazel" (1954) 2. Toronto, Canada.—*C.E.P.B.*

6.9-160

551.515.2(52):532.593:550.342

*Daidoji, S.; Nakagawa, K. and Fukushima, T., **Swells and microseisms observed at Hachijo Island on the occasion of the typhoon "Agnes" on Nov. 6, 1952.** *Journal of Meteorological Research*, Tokyo, 5(10/12):747-751, Jan. 1954. 4 figs., table, 7 refs. In Japanese; English summary p. 747. MH-BH—On the occasion of Typhoon "Agnes," which passed near Hachijo Island on Nov. 6, 1952, conspicuous swells and microseisms were recorded on the self-registering wave gage installed on the southwestern coast of this island and on the portable seismograph installed at the Hachijo Weather Station, respectively. In this paper descriptions are given of the amplitudes and periods of these swells and microseisms, and some discussion is included on their relations to meteorological conditions. *Subject Headings:* 1. Microseisms and swell from typhoons 2. Typhoon "Agnes" (1952) 3. Hachijo Island, Japan.—*Authors' abstract.*

6.9-161

551.515.2(5):551.577.37

§Ramage, C. S., **The cool-season tropical disturbances of southeast Asia.** *Journal of Meteorology*, 12(3):252-262, June 1955. 18 figs., table, 15 refs. DWB—In 15-25°N 95-120°E, Dec. through April are normally dry due to convergence above 400 mb resulting in subsidence. When subsidence ceases, heavy rain may occur. In early winter this situation arises with tropical storms or easterly waves moving westward south of the subtropical ridge. In late winter and spring, troughs crossing southern India break down the high-tropospheric convergent westerlies. They intensify and slow down or stagnate over Thailand and Indo-China, causing low-level convergence. Examples of both processes are described in 3-dimensional synoptic studies. *Subject Headings:* 1. Tropical disturbances 2. Precipitation anomalies 3. Southeast Asia.—*C.E.P.B.*

6.9-162

551.515.21

§Sherman, L. and Carino, I., **A note on hurricane Able of 1952.** *American Meteorological Society, Bulletin*, 35(5):220-222, May 1954. 4 figs., 5 refs. MH-BH—A systematic analysis of hurricane "Able," including the hyperbolic point at each stage, is presented. A set of maps showing surface streamlines for a single day are shown. The method used involved "direct streamline analysis, the 'fairing' in of streamlines so as to agree with the carefully plotted arrows." *Subject Headings:* 1. Hurricane analysis 2. Streamline analysis 3. Hurricane "Able" (1952).—*I.L.D.*

6.9-163

551.515.3:551.551:551.557:629.13

Bethwaite, F. D., **Some unusual aspects of turbulence.** *Royal Aeronautical Society, Journal*, 59(531):220-225, March 1955. 7 figs. DWB—Referring to Thunderstorm Project, author describes personal experiences of large sharp-edged horizontal gust sequences giving velocity differences of 130-162 ft/sec in New Zealand, lasting several seconds at 130 kt. Author attributes them to adjacent pairs of high level "water spouts" or vortices, revolving in the

same sense, with a definite front between them. He considers that aircraft may meet stresses far beyond those designed against. Effects on piloting are discussed. *Subject Headings:* 1. High level turbulence 2. New Zealand.—C.E.P.B.

6.9-164

551.515.3:551.543.5(791)

DeMastus, H. L., (*Palm Heights Weather Station, Phoenix, Ariz.*), **Pressure disturbance in the vicinity of dust devils.** *American Meteorological Society, Bulletin*, 35(10):497-499, Dec. 1954. 2 figs. MH-BH—The meteorological conditions associated with the appearance of three dust devils on April 17, 1954 at Phoenix, Arizona, are described. A microbarograph record taken during the occurrence of the dust devil is reproduced. A sudden fall in pressure was recorded with the passage of the dust devils. *Subject Headings:* 1. Dust devils 2. Pressure variations 3. Phoenix, Ariz.—I.L.D.

6.9-165

551.515.3(744)

Falconer, Raymond F. and Schaefer, Vincent J. (*GE Res. Lab., Schenectady*), **Cloud atmospheric-electric observations of the formative stages of the Worcester, Massachusetts tornado.** *American Meteorological Society, Bulletin*, 35(9):437-440, Nov. 1954. 3 figs., 3 refs. DWB—Photographs of the storm cloud associated with the Worcester tornado between 1355 and 1405, June 9, 1953, and charts of atmospheric electricity, solar radiation, wind direction, and velocity associated with June 9, 1953 tornado and, for contrast, with high winds and visible dust on April 23, 1953, are presented and analyzed. *Subject Headings:* 1. Tornado clouds 2. Atmospheric electricity 3. Tornado, Worcester, Mass. (June 1953) 4. Worcester, Mass.—I.L.D.

6.9-166

551.515.3

Kangieser, Paul C., **A physical explanation of the hollow structure of waterspout tubes.** *Monthly Weather Review*, 82(6):147-152, June 1954. 8 figs., 7 refs., 3 eqs. MH-BH—Experimental observations were made on the behavior of minute foreign particles such as vapor from steaming water surfaces, spray particles and fine sawdust, introduced into a mechanically produced vortex. Phenomena resembling naturally occurring vortices are observed, and the physical basis of the hollow interior is a result of the equilibrium established between the centrifugal and drag forces on the particle. This assumption is developed quantitatively and a model explaining the development of a waterspout, namely the Rankine combined vortex is proposed. A similar explanation is proposed for tornadoes and dust devils. *Subject Headings:* 1. Waterspout models 2. Vortexes.—I.L.D.

6.9-167

551.515.4(481)

*Hesstvedt, Eigel, **Thunderstorm frequency in Norway 1936-1950.** *Norske Videnskaps Akademi i Oslo. Institutt for Vær- og Klimaforskning, Publication*, No. 2, 1954. 58 p., 5 figs., 5 refs., 3 tables. Also issued as: *Oslo. Universitet. Institutt for Teoretisk Astrofysikk, Publication*, No. 4, 1954. DWB—MOHN (1923) using 75 stations in Norway and SCHÖNBERG (1932) using 90 stations, made attempts at calculating the geographical distribution and annual variation in thunderstorms in Norway for 1874-1913 and 1888-1907, respectively. The present author uses 407 stations for 1936-50, of which 308 have continuous records. Data for 94 other stations were analyzed but rejected. Sources of error are analyzed and regional and seasonal variations discussed. Monthly and annual frequencies are presented for each station, grouped according to region. Averages and standard deviations for each of over 60 areas are tabulated. Isobronts are shown for Norway on charts for each season and for year. *Subject Headings:* 1. Thunderstorm frequency data 2. Norway.—M.R.

6.9-168

551.515.43(432)

Koch, Horst-Günther, **Hanggewitter, Hangerwärmung und Hangströmung am Thüringer Wald.** [Slope thunderstorms, slope warming and slope currents in the Thuringian Forest. *Petermanns Geographische Mitteilungen*, 99(2):107-109, 1955. 2 figs., 7 refs. DLC—Purely local heat thunderstorms are rare in temperate latitudes. A typical example occurred on 1 July 1947. Upper winds were light N-E. The temperature for instability ("release temperature") was about 32°C which was reached in the central German mountainous area.

Distribution of thunder rains is shown; the centers lie along the slopes of the Thuringian mountains. It is compared with the maximum surface temperature (reduced to sea level) and winds on 28 June 1952 (in 1947 there were insufficient stations); thunderstorm centers agreed with highest temperatures and convergence. *Subject Headings: 1. Thunderstorm distribution 2. Thuringia, Germany.—C.E.P.B.*

6.9-169

551.515.8:551.558.21 (42):532.59

Wallington, C. E., *Lee waves ahead of a warm front.* *Royal Meteorological Society, Quarterly Journal*, 81(348):251-257, April 1955. 5 figs., table, 2 refs., 8 eqs. DWB—A glider flight in a smooth lee wave ahead of a warm front was investigated theoretically. The contours at Camphill were represented by three idealized ridges and two valleys and the waves calculated. As the front approaches the waves increase in length and amplitude; the calculated vertical velocity agreed with the observed lift. *Subject Headings: 1. Lee waves 2. Camphill, Eng.—C.E.P.B.*

6.9-170

551.515.83

Reed, Richard J., *A study of a characteristic type of upper-level frontogenesis.* *Journal of Meteorology*, 12(3):226-237, June 1955. 13 figs., table, 16 refs., 12 eqs. DWB—The potential vorticity on isentropic surfaces is used to study a characteristic type of upper-level frontogenesis—the development of a sloping stable layer marked by strong vertical wind shear and rapid upward decrease in humidity. In the case studied [Dec. 13-15, 1953] it was found that the intense portion of the frontal zone consisted of a thin wedge of stratospheric air which had descended to very low levels (700 to 800 millibars), the frontal boundaries being a folded portion of the original tropopause. The circulation within the frontal zone was indirect solenoidal, and surface cyclogenesis accompanied or slightly preceded the strengthening of the upper-level front. Although the frontal zone formed entirely within a polar air-mass, the strong adiabatic heating at and near the warm boundary could give the false impression that tropical air was present there at the end stage. *Subject Heading: 1. Frontogenesis.—Author's abstract.*

RADIATION AND TEMPERATURE

See: Solar eclipse (Dirmhirn), 6.9-318.

RADIATION

See also: Radiat. research (Ångström), 6.9-24; Solar radiat. networks (Drummond), 6.9-37; Radio noise bibliog. (Carpenter), 6.9-41; Solar constant (Georgi), 6.9-78; Solar radiat. recording (Pastiels), 6.9-104; Atmos. radiat. transfer (Kaplan), 6.9-146; Radiative transfer (Plass, Fivel), 6.9-147; Thermal balance of animals (Kelly, others), 6.9-302; Sky brightness (de Bary, others), 6.9-323; Auroral spectrum (Petrie, Small), 6.9-334; Auroral arcs (Chamberlain), 6.9-336.

6.9-171

551.521.1

Deirmendjian, Diran and Sekera, Zdenek (*Dept. of Met., Calif. Univ. at L. A.*), *Global radiation resulting from multiple scattering in a Rayleigh atmosphere.* *Tellus*, 6(4):382-398, Nov. 1954. 5 figs., 5 tables, 23 refs., 22 eqs. MH-BH—Using CHANDRASEKHAR's solution for the radiative transfer problem in a plane-parallel model of the earth's atmosphere, under the assumption of perfect, conservative scattering according to the Rayleigh law, expressions are derived for the relative global and sky radiation received on a horizontal surface, as a function of normal optical thickness and inclination of incoming parallel radiation. The corrections representing the effect of ground reflection are also expressed in terms of certain functions already defined by CHANDRASEKHAR. These expressions, which include the effect of all orders of scattering, are then used to compute the absolute global and sky radiation as a function of wavelength and solar zenith distance, based on the solar extraterrestrial energy curve as given recently by NICOLET. The results show that, under these assumptions, the global radiation received at the surface of the earth should remain essentially constant in spectral distribution for a wide range of solar altitudes, and that the pure sky radiation should have two maxima, centered at 3,300 Å and 4,100 Å, respectively, for solar zenith distances

ranging between 0° and 45° . The theoretical work is compared with BERNHARDT's results obtained by means of certain simplifying assumptions about the successive orders of scattering. The absolute global and sky radiation is integrated over the range 0.29μ to 4.00μ , and it is shown that in general the computation is in good agreement with existing measurements under clear sky conditions. *Subject Headings:* 1. Global radiation 2. Rayleigh atmosphere 3. Scattering of radiation.—*Authors' abstract.*

6.9-172

551.521.1(493)

Dogniaux, R., *Étude de climat de la radiation en Belgique, 3^{me} partie.* [Study of radiation climate in Belgium, pt. 3.] *Ciel et Terre*, Uccle, Belgium, 70(7/8):241-250, July/Aug. 1954. 22 figs., eq. MH-BH—Radiation instruments used are described. The diurnal and annual variations of direct solar irradiation on differently exposed surfaces at Uccle are shown, as well as global radiation and its components. (For Pts. 1 and 2, see items 6.1-161, Jan. and 6.8-218, Aug. 1955 MAB.) *Subject Headings:* 1. Solar radiation 2. Global radiation 3. Radiation climate 4. Uccle, Belgium.—A.A.

6.9-173

551.521.1:621.47

Magat, Richard, *Sun harnessed for cooking.* *Science News Letter*, 66(20):314, 319, Nov. 13, 1954. illus. DLC—A description and illustration of a solar cooker, intended for use in India and other countries short on fuel (such as India), which has been developed by DR. MARIA TELKES of New York Univ. College of Engineering. It will store heat for an hour or so after sundown, to make it more useful in cooking the evening meal and to make it unnecessary to change position frequently to catch direct sunshine. Temperatures up to 300°F will be generated on days when outdoor temperatures are under 70°F . Even higher temperatures (for broiling) can be had on clear days. It could sell for \$5 if manufactured in quantity. *Subject Heading:* 1. Solar cookers.—M.R.

6.9-174

551.521.11

*Mateer, C. L., *Average insolation in Canada during cloudless days.* *Canadian Journal of Technology*, Ottawa, 33:12-32, 1955. 2 figs., charts, 12 refs. Abstracted from reprint. DLC—Charts of the estimated insolation received in various parts of Canada on cloudless days have been prepared for the 15th day of each month, following the method used by FRITZ in preparing such charts for the continental United States. In December, the charts show a strong latitudinal gradient of cloudless day insolation, with values ranging from about 150 langleys per day along the southern border to zero in the region of the polar night. In June, however, the amount of cloudless day insolation is about 750 langleys per day over most of Canada with lower values in regions of high atmospheric pollution and higher values in regions of greater elevation. *Subject Headings:* 1. Insolation 2. Canada.—*Author's abstract.*

6.9-175

551.521.11:551.576.2

Neumann, J. (*Israel Met. Service, Tel Aviv*), *Insolation in relation to cloud amount.* *Monthly Weather Review*, 82(11):317-319, Nov. 1954. 4 refs., 10 eqs. MH-BH, DWB—Assuming a simple pyrheliometric station model, an equation is derived relating the amount of insolation Q from a sky whose fraction C is covered by clouds, to the insolation Q_0 arriving at the same surface from a cloudless sky. The equation is of the form: $Q/Q_0 = 1 - (A - a)(1 + a)C$, where A is the sum of cloud albedo and absorptivity expressed as fraction of the radiation incident on cloud tops and the symbol a represents the depletion coefficient of insolation in cloudless air in the layer between cloud top and cloud base levels. The theoretical equation resembles the empirical equation $Q/Q_0 = 1 - kC$ where k is supposed to be a constant. The theoretical equation shows the dependence of k on relevant physical variables. It is shown that the theoretical equation combined with results of pyrheliometric observations, from which a value of k has been deduced, leads to a value of A which is in close accord with its value obtained by independent methods. On the other hand, if we assume reasonable values for A and a , the resulting value for k is in good agreement with the best value found from pyrheliometric observations. *Subject Headings:* 1. Insolation 2. Cloudiness effects on insolation 3. Albedo of clouds.—*Author's abstract.*

6.9-176

551.521.32:551.509.532

Falckenberg, G. (Rostock), **Die Konstanten der Ångströmschen Formel zur Berechnung der infraroten Eigenstrahlung der Atmosphäre aus dem Zenith.** [The constants of the Ångström formula applied to calculation of infrared atmospheric radiation from the zenith.] *Zeitschrift für Meteorologie*, 8(7/8):216-222, July/Aug. 1954. 3 figs., port., 2 tables, 14 refs., 2 eq. German summary p. 216. **MH-BH**—The constants of the Ångström formula for calculating the infrared counterradiation are determined by means of many measurements and used to calculate the atmospheric infrared radiation from the zenith. Measurements were made by means of a specially constructed actinometer with angle of opening of 44° and were carried out daily at one hour intervals. The influence of time of day and of the Baltic Sea upon the intensity of the counterradiation from the zenith was investigated. Such measurements can be used to predict with greater accuracy the incidence of night frosts. *Subject Headings: 1. Actinometric observation 2. Ångström's formula 3. Frost forecasting.*—I.L.D.

6.9-177

551.521.3:551.590.25:551.593.653

*Giovanelli, R. G. (Div. of Physics, Univ. Grounds, Sydney), **The attenuation of light by meteoric dust in the upper atmosphere.** *Australian Journal of Physics*, Melbourne, 7(4):641-648, Dec. 1954. 4 tables, 16 refs., 6+eqs. **MH-BH**—An examination of ZACHAROV's results on the wavelength variation of attenuation of solar radiation following the Perseid meteor shower shows that the effects could be produced either by absorbing particles of diameter about 10^{-6} cm or less, or by transparent particles of diameter in the range 5×10^{-6} to 10^{-4} cm. The rapid disappearance of attenuation, however, can be explained only if the particles evaporate on falling and it is concluded that they are ice crystals formed on nuclei of meteoric origin at a height of about 80 km where there is a temperature minimum. From estimates of the light scattered by these ice crystals it is deduced that they would be visible as noctilucent clouds. *Subject Headings: 1. Radiation attenuation 2. Meteoric dust effects 3. Noctilucent clouds.*—Author's abstract.

6.9-178

551.521.3:523.877

Horak, Henry G. (Univ. of Kansas), **The transfer of radiation by an emitting atmosphere.** *Astrophysical Journal*, Chicago, 119(3):640-646, May 1954. table, 37 eqs. **DWB**—The transfer of radiation by a plane-parallel atmosphere containing a uniform distribution of emission sources is considered for the following cases: (a) scattering according to the Rayleigh phase function and (b) Rayleigh scattering. The exact expressions for the emergent intensity are derived for finite atmospheres. The solutions in the n th approximation for any path τ are also given. Polarization calculations are made for an atmosphere of optical thickness $\tau_1 = 0.20$. (For Pts. 1 and 2, see items 4.11-147, Nov. 1953 and 6.6-197, June 1955, AB.) *Subject Headings: 1. Radiative transfer 2. Emission spectra 3. Rayleigh scattering.*—Author's abstract.

6.9-179

551.521.4:534

Donahue, T. M. and Foderaro, A. (Univ. of Pittsburgh), **The effect of resonance absorption on the determination of the height of airglow layers.** *Journal of Geophysical Research*, 60(1):1-86, March 1955. 5 figs., 18 refs., 46 eqs. **DWB**—The theory of the self-absorption of resonance photons within a luminescent airglow layer is developed and expressions obtained analogous to the Van Rhijn equation for the variation of intensity as a function of zenith angle. The measured flux is shown to be a function of $L_o/\sqrt{T}$, where L_o is the vertical thickness in atoms/cm² and T the absolute temperature of the layer. The attenuation at large zenith angles in the case of the sodium D lines is shown to be large enough when L_o is between 1 and $<10^{10}$ cm⁻² and T between 160° and 220° to cause a layer at 70 km to simulate a non-absorbing (Van Rhijn) layer between 200 and 300 km. If self-absorption is important, it is shown that the ratio of D_1 to D_2 intensity should vary with zenith angle and different apparent heights and for the two components. Accurate measurements of L_o and T are shown to be necessary for even good approximate height deductions where resonance radiation (for example, Na and OI) is concerned. *Subject Headings: 1. Night airglow 2. Night airglow layer heights 3. Resonance absorption.*—Authors' abstract.

6.9-180

551.521.1

Pettit, Helen B.; Roach, F. E.; St. Amand, P. and Williams, D. R., **A comprehensive study of atomic emissions in the nightglow.** *Annales de Géophysique*, Paris, 10(4):326-341, Oct./Dec. 1954. 13 figs., 12 tables, 12 refs. French and English summaries p. 326. **MH-BH-180**—A study of the nightglow emissions at $\lambda 5577$, $\lambda 5893$, and $\lambda 6300$ Å at Cactus Peak, California during the period November 1948 to March 1954 shows that the diurnal and seasonal intensity variations are in good agreement with previous reports. No correlation between sunspot activity and the intensity of any of the emissions is found. The only positive correlation between any two of the emission intensities is for 5893 and 6300. The directional tendency for the area of maximum brightness for any one night to be north, in the zenith, or south of Cactus Peak has a seasonal variation in all three emissions, with that of sodium being most pronounced. In the summer, when the intensity for sodium is the lowest, the predominant direction of its maximum is south; in the winter, when the intensity is greatest, the direction is north. This fact leads to a prediction of a possible geographical motion of the maximum intensity area of sodium. *Subject Headings: 1. Night airglow 2. Night airglow spectrum 3. Atomic emissions in night airglow 4. Cactus Peak, Calif.—Authors' abstract.*

6.9-181

551.521.61:535.7

Godson, Warren L., **The computation of infrared transmission by atmospheric water vapor.** *Journal of Meteorology*, 12(3):272-284, June 1955. 5 figs., 3 tables, 11 refs., 58 eqs. **DWB**—The problems of flux transmission over a narrow spectral interval by water vapor in an atmospheric layer are discussed. The theory of transmission coefficients for a stratified atmosphere is set out and a flux transmission function involving only two parameters and a correction term is developed. An example for a 5-layer atmosphere containing a moist layer is given. The method is simple and accurate over the whole transmission range. *Subject Headings: 1. Infrared transmission calculations.—C.E.P.B.*

6.9-182

551.521.7:550.385:523.7

Davies, R. D., **An analysis of bursts of solar radio emission and their association with solar and terrestrial phenomena.** *Royal Astronomical Society, Monthly Notices*, 114(1):74-91, 1954. 14 figs., 7 tables, 20 refs. **DWB**—Solar radio emission records on seven frequencies in the range 60 to 10,000 Mc/s were studied over a period of 18 months. The analysis, which includes a number of histograms, shows that many of the properties of bursts change with frequency. A study of the time delay between bursts on different frequencies revealed that 3000 Mc/s bursts often occur first; a simultaneous up and down movement of ionized material from the level of zero refractive index at that frequency is postulated. It is found that bursts were more frequent than flares, fadeouts and crotchets and that they almost always accompanied these effects. The commencement of bursts appears to be simultaneous with that of flares and crotchets but precedes that of fadeouts by about two minutes. In addition, there is a rough correlation between the intensity of bursts, flares, fadeouts and crotchets. *Subject Headings: 1. Solar radio radiation 2. Solar activity 3. Magnetic disturbances.—Authors' abstract.*

AIR TEMPERATURE

See also: Frost damage to wheat (Okato, Izumi), 6.9-69; *Temp. effects* (Bock, Franklin), 6.9-72; *Canadian temps.* (Longley), 6.9-94; *Atmos. ozone* (Khalek), 6.9-140; *Soil temp.* (Gutman), 6.9-194; *Wind, temp. and evapor.* (Schmuck), 6.9-208.

6.9-183

551.524.2(41/2):551.524.3:5

Gregory, S., **Accumulated temperature maps of the British Isles.** *Institute of British Geographers, Transactions and Papers*, Publ. No. 20:59-73, 1954. 7 figs., 3 tables, 25 refs. **DLC**—Maps of accumulated temperature above 42.8°F (6°C) calculated from monthly mean temperatures for 1881-1915 are constructed for the year, winter, and individual months April-Nov. The rate of change from one month to the next is shown for 6 stations. *Subject Headings: 1. Accumulated temperatures 2. British Isles.—C.E.P.B.*

6.9-184

551.524.3(4)

Heyer, E. (*Inst. of Weather Research, Potsdam*), **Über die Kennzeichnung der Winter durch Kältessummen und den Temperaturverlauf der Folgezeit.** [The characterization of winter by cold sums and the temperature course of the following period.]

of winter by means of cold sums and the temperature variations of the subsequent period.] *Zeitschrift für Meteorologie*, 8(7/8):211-215, July/Aug. 1954. 5 tables, 5 refs. German summary p. 211. **MH-BH**—Cold sums were defined by HELLMANN as the sums of negative daily means of temperature for the months Nov.-March. Analyzing the cold sums for Berlin for the winters 1766/67-1947/48, the author finds that these can be used to characterize the Central European winters. Temperatures of months following winter cannot be predicted reliably; but a severe winter is generally followed by a cool summer. *Subject Headings*: 1. Cold sums 2. Long period records 3. Temperature variations 4. Berlin, Germany. —*I.L.D.*

6.9-185

551.524.32:551.588.1(489)

*Hovmöller, E., *Temperaturens aarlige Gang i Indlandet og ved Kysterne*. [Annual course of inland and coastal temperatures.] *Geografisk Tidsskrift*, Copenhagen, 47:204-241, 1944/1945. 16 figs., 6 tables, refs. p. 239-241. **DWB**—The characteristics of the annual variation of temperature of various localities in Denmark are shown to be the result of the distribution of land and water. In this study the sine curve which most clearly describes the annual variation of temperature is derived and the relationship of the sine curve to the astronomical year is examined and a simple method for calculating approximately the difference between the temperature curve and the astronomical year is developed. The deviations between the observed monthly mean temperatures for various locations and the calculated values from the sine curve are investigated. The annual amplitude of temperature and the phase differences in relation to the astronomical year for Denmark and for northwestern Europe are shown on maps. A physical explanation for the effects of land and water upon the annual temperature variation is proposed. *Subject Headings*: 1. Annual temperature variations 2. Oceanic influences 3. Continentality 4. Denmark.—*I.L.D.*

6.9-186

551.524.36

Cohn, Howard, *Coldest town in America*. *Colliers*, N. Y., 135(5):24-25, March 4, 1955. Photos. **DWB**—Popular, illustrated article about winter conditions in International Falls, Minn., the coldest first order station in the U. S. (not in America). Average annual temperature is 36.3°F and Jan. mean temperature 3°F. Snow stays on ground from Nov. to April. Parkas are used by all (men, women and children) so comfort is not a problem. Schools never close on account of weather, and absence or sickness is rare. Automobile maintenance and snow removal from streets is chief winter problem in this modern town of 6500 people. *Subject Headings*: 1. Coldest places in the U. S. 2. Acclimatization 3. Extreme temperatures 4. International Falls, Minn.—*M.R.*

6.9-187

551.524.37(434.6)

Lessmann, Helmut, *Strenge und Wirkung der Spätfroste 1953 in Südbaden*. [Severity and effect of the late frost of 1953 in south Baden.] *Meteorologische Rundschau*, 8(1/2):32-35, Jan./Feb. 1955. 4 figs., 8 refs. **MH-BH**—Severe frost on May 11 caused widespread damage to vegetation. The distribution of the damage is plotted; it is not closely related to the area with minimum temperature below -4°C. Frost occurred on low and high ground with an intermediate frost free zone about 400 m due to a föhn-like fall wind. The low ground frost was due to cold air pools caused by radiation. The severity F of the frost is represented by $F=10 M/h$, where M is minimum temperature and h is height above MSL in hektometers; where F was below -6 damage was generally severe. *Subject Headings*: 1. Frost 2. Baden, Germany.—*C.E.P.B.*

6.9-188

551.524.4:551.511

Lake, J. V., *The nocturnal heat balance*. *Nature*, London, 176(4470):32-33, July 2, 1955. 1 fig., 9 refs. **DWB**—Air temperature profile obtained 0-5 in. above bare soil on a clear night before sunrise on March 22 near Reading decreased from 18-19° just above soil to 16.5° at 2½ ft, increasing slightly above. Soil surface 23°F. Smallest standard deviation was also at 2½ ft. This supports the conclusion of RAMANATHAN and RAMDAS that layers a few inches above the ground are in radiative rather than conductive equilibrium with surroundings. *Subject Headings*: 1. Heat balance 2. Temperature profiles 3. Reading, England.—*C.E.P.B.*

6.9-189

551.524.7:523.

Attmannspacher, W., **Chromosphärische Eruptionen und Temperaturen in Höhe d 15 mb-, 41 mb- und 96 mb-Fläche.** [Chromospheric eruptions and temperatures of the 15, 41 and 96 mb surfaces.] *Meteorologische Rundschau*, 8(1/2):12-16, Jan./Feb. 1955. 2 figs, 9 tables, 9 refs. **MH-BH**—Temperatures at 15, 41 and 96 mb were compared with number of solar flares in 1951-52. No relation was found with monthly mean temperatures in Berlin even after eliminating the annual variation. Changes from 2 days before to 3 days after eruptions all over the world showed on the whole a slight warming (about 1°C) from the day before to the day after. At 15 mb the rise was on the day of the flare and the following day at 41 mb on the day of the flare and at 96 mb from the first to the second following day. The rise is attributed to absorption in the ozone layer. *Subject Headings:* 1. Solar flares 2. Upper air temperatures.—*C.E.P.B.*

6.9-190

551.524.7 551.5

Conover, W. C. and Wentzien, C. J., **Winds and temperatures to forty kilometers.** *Journal of Meteorology*, 12(2):160-164, April 1955. 9 figs., 17 refs. **DWB**—Data from 11 balloon flights (88 above 30 km) at Belmar, New Jersey, are summarized. Graphs show the average seasonal temperatures and wind components up to 40 or 42 km and selected ascents. Temperatures are higher in summer than winter except about 12-16 km. Winds increase from W above 22 km in fall and winter; at other seasons they are light easterly. *Subject Headings:* 1. Upper air temperature data 2. Upper air wind data 3. Belmar, New Jersey.—*C.E.P.B.*

6.9-191

551.524.7:551.571.7(4)

Hering, W., **Vergleich der Radiosonden-Aufstiege in Lindenberg, Berlin-Wuhlheide und Berlin-Tempelhof vom 19.9.1954.** [Comparison of radiosonde ascents at Lindenberg, Berlin (Wuhlheide) and Berlin (Tempelhof) on Sept. 19, 1954.] *Zeitschrift für Meteorologie*, 9(3):123-125, April 1955. 1 fig. **DWB**—Three simultaneous ascents in or near Berlin are plotted. Temperatures at Lindenberg and Wuhlheide (German radiosondes) agreed closely; Tempelhof (American radiosonde) differed by up to 6°C in stratosphere. The relative humidity tracings showed considerably smaller lag on the American instrument. *Subject Headings:* 1. Radiosonde comparisons 2. Upper air observation.—*C.E.P.B.*

6.9-192

551.524.7:551.509.

Kumar, S. (*Met. Off., New Delhi*), **On the interdiurnal variations of upper air temperatures.** *Indian Journal of Meteorology and Geophysics*, Delhi, 5(3):293-295, July 1954. 1 fig. **DWB**—Since temperature forecasts for jet airliners flying at high altitudes are merely repetitions of temperatures observed on the latest radiosonde ascent, the magnitude of the interdiurnal temperature change is very important. A study of such day-to-day changes at 800, 500, 400, 350, 300, 250 and 200 mb at Calcutta and Delhi during monsoon, pre-monsoon and winter and post monsoon seasons reveals frequent drops of 25° to 45°F (max. at 250 mb) and rises up to 25°F (in Jan.) and lesser but correspondingly sudden changes at other seasons. These occurrences are analyzed by synoptic types to give a clue to what to forecast. *Subject Headings:* 1. Interdiurnal upper air temperature changes 2. Upper air temperature variations 3. Upper air temperature forecasting 4. Delhi, India 5. Calcutta, India.—*M.R.*

6.9-193

551.524.7:551.574

Lamb, H. H., **Two-way relationship between snow or ice limit and 1000-500 mb thicknesses in the overlying atmosphere.** *Royal Meteorological Society, Quarterly Journal*, 81(344):172-189, April 1955. 3 figs., 7 tables, 17 refs. **DWB**—At heights of 850-500 mb the mean temperature depends on the thickness of the 1000-500 mb layer within 3°F. The height of the freezing level and the type of precipitation are also related to the thickness, and to the location (oceanic or continental) and the existence of a snow cover. The ablation of extensive snow covers is discussed. At the edge of a snow cover the mean thickness is $17,297 \pm 170$ ft. Thicknesses of 18,000 ft do not transgress over extensive snowfields and of 17,800 ft not more than 500 naut. mi; coincidence of a mountain barrier may have a decisive effect. The bearing

on forecasting and on the character of the season is considered. *Subject Headings: 1. Thickness patterns 2. Snow cover.—C.E.P.B.*

SOIL TEMPERATURE

6.9-194

551.525.2:551.524.2

Gutman, L. N., **K voprosu o raschete temperatury pochvy.** [Calculation of soil temperature.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizicheskaiia*, No. 2:114-122, 1954. fig., table, 18 refs. **DLC**—The thermal relationship between a bare soil (snow cover is absent) and the atmosphere immediately above it is investigated. Formulas for calculating the mean daily soil temperature from the air temperature measured at the height of the Stevenson screen are derived. The application of a formula to a specific case is illustrated. *Subject Headings: 1. Soil-air heat exchange 2. Soil temperature calculations.—I.L.D.*

6.9-195

551.525.4

Kashpur, I. N., **Izmerenie temperatury v samoi glubokoi skvazhine Donbassa.** [Measuring temperature in the deepest pit-hole of Donbass.] *Priroda*, Moscow, 44(3):88-89, March 1955. fig. **DLC**—The vertical distribution of the temperature to a depth of 1450 m is shown as a straight line; a temperature of 54°C is recorded at 1450 m. A more detailed analysis of temperature changes with depth indicates the increase of temperature is not uniform but slow. Local anomalies are associated with local deposits of coal beds. *Subject Headings: 1. Borehole temperatures 2. Donbass, U.S.S.R.—I.L.D.*

6.9-196

551.525.5:546.212:548

Steinemann, Samuel (*Weissfluhjoch, Davos*), **Kammeis, eine anomale Wachstumsform der Eiskristalle.** [Fibrous ice, an anomaly in the growth of ice crystals.] *Zeitschrift für angewandte Mathematik und Physik*, 4(6):500-506, Nov. 15, 1953. 8 figs., 21 refs. English summary p. 506. **DLC**—Fibrous ice is a form of frost in soils. The fibers grow in the underlying melt and are pushed upward. The habit is sometimes described as hexagonal prisms. This could not, in general, be verified, and an analysis with the universal stage showed that the optical axes of the crystallites lie preferentially perpendicular to the direction of growth and so to the temperature gradient. This is an anomaly in the growth of crystals from a melt. *Subject Headings: 1. Ice crystal growth 2. Permafrost.—Author's abstract.*

WATER TEMPERATURE

See also: Peruvian coastal current (Sears), 6.9-55; Greenland Ice Cap, 6.9-58.

6.9-197

551.526.8:551.481.1

Melin, Ragnar, **Currents caused by water flowing through lakes.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, [Transactions]*, Oslo, 1948, Vol. 1:373-377, [n.d.] 6 figs., ref. **DWB**—In connection with a study of currents, artificially increased by discharge from storage reservoirs during the winter, temperature-depth distribution and ice profiles are presented for Lake Kallsjön. *Subject Headings: 1. Lake temperatures 2. Ice cover 3. Lake Kallsjön, Sweden.—A.A.*

PRESSURE AND WIND

PRESSURE

See also: Pressure reduction (WMO), 6.9-12; Variance in pressure field (Eliassen), 6.9-120; Atmos. variables (de Lisle), 6.9-138; Baroclinic structure (McIntyre), 6.9-155; Pressure disturbances (DeMastus), 6.9-164.

6.9-198

551.542:551.590.21

Rangarajan, S. (*Kodaikanal Observ.*), **Solar influence on barometric pressure.** *Indian Journal of Meteorology and Geophysics*, Delhi, 5(3):291-293, July 1954. 2 figs., 7 refs. **MH-H**—Following work of DUELL and DUELL (1948) and others, the author analyzes variations

in barometric pressure in South India at Madras and Tiruchirapalli, for periods July 13-Oct. 1952, and June 1-Aug. 20, 1953, respectively (years of low sunspot activity) and showed a tendency of recurrence at 27-day intervals, with tendency persisting for 3 consecutive solar rotations. This same recurrence tendency was found in 1913-14 data (also low sunspot years). During 1948 and 1949 (high sunspot activity) no such recurrence was noted in pressure. *Subject Headings: 1. Solar influences 2. Pressure variations 3. South India*—M.R.

6.9-199

551.543:525.6 525.

Maksimov, I. V., *O mnogoletnikh prilivnykh iavleniakh v more i v atmosfere zemli* [Long period tide phenomena in the sea and in the atmosphere.] *Akademiia Nauk SSSR Institut Okeanologii, Trudy*, 8:18-40, 1954. 9 figs., 6 tables, 9 refs. **DLC**—This article contains a discussion of long period tidal phenomena in the Atlantic Ocean, in particular the 19-year cycle of sea level fluctuation and long period fluctuation of ice conditions in the Arctic Ocean; long period tides in the earth's atmosphere, namely the 19-year oscillation of mean atmospheric pressure and of mean annual precipitation; and long period changes in the tide-forming faces of the moon. *Subject Headings: 1. Tides 2. Atmospheric tides 3. Tide cycle*—I.L.D.

6.9-200

551.543:523

Maksimov, I. V., *Nutatsionnaia tsirkumpoliarnaia baricheskaja volna v atmosfere zemli* [Nutational circumpolar baric waves in the earth's atmosphere.] *Akademiia Nauk SSSR Doklady*, 100(1):49-52, Jan. 1, 1955. 2 figs., 2 tables, 7 refs. **DLC**—The general laws of the planetary waves are investigated as the basis of mean monthly values of atmospheric pressure for different points of the Northern and Southern Hemispheres over two 1-year periods. The two time series were analyzed separately in such a way that the 12-month variation of atmospheric pressure was eliminated. The characteristics of the planetary waves are tested viz.: they are asymmetrical standing pressure waves rotating about the poles; the pressure wave rotates from west to east; they are not periodic phenomena; their amplitude not only changes with latitude but they also differ with longitude; etc. *Subject Headings: 1. Nutation 2. Pressure waves 3. Circumpolar baric waves*.—I.L.D.

6.9-201

551.543:525

Maksimov, I. V., *O "poliusnom prilive" v more i atmosfere zemli*. [Polar tide in the sea and in the earth's atmosphere.] *Akademiia Nauk SSSR Institut Okeanologii, Trudy*, 8:92-118, 1954. 25 figs., 11 tables, 9 refs. **DLC**—It is shown that the free nutation of the earth's axis is the cause of the polar tide in both the world ocean and atmosphere of the earth. In the former it is manifested as the 14-month fluctuation of the mean sea level and is associated with changes in the circulation of the waters. In the latter the polar tide is expressed as the 14-month fluctuation in mean atmospheric pressure corresponding to changes in the atmospheric circulation resulting from changes in the meteorological variables. Both in the seas and in the atmosphere the polar tides appear as sea level and basic circumpolar waves rotating about the pole from event to event with a maximum amplitude in the middle latitudes. The secular changes in the polar tide are reviewed. (This is fuller version of article abstracted as 5.5-13 May 1954, *MAB*.) *Subject Headings: 1. Atmospheric tides 2. Tides 3. Nutation*.—I.L.D.

6.9-202

551.547:1 519

Lally, Vincent E. (U. S. A. F. Cambridge Research Center, G. R. D.), *Use of anomalies in the design of a hydrostatic computer*. *American Meteorological Society, Bulletin*, 35(10):478-480, Dec. 1954. table, 2 refs., 11 eqs. **MH-BH**—The use of deviations from standard values rather than the use of absolute values enables computations to be made with low precision without any accompanying loss in accuracy. Computation of the altimeter correction rather than the absolute height permits the design of a hydrostatic computer with tenfold increase in accuracy when employing computing elements of similar precision. *Subject Headings: 1. Altimetry 2. Hydrostatic computers*.—*Author's abstract*.

TURBULENCE

See also: **Atmos. turbulence** (Sutton), 6.9-7; **Gust velocities** (Coleman, others), 6.9-63; **Gust frequencies** (Coleman, others), 6.9-64; **Gust loads** (Steiner), 6.9-65; **Airspeed data** (Walker), 6.9-66.

6.9-203

551.551:551.507.321

Arnold, A. (*Signal Corps Engr. Lab. Ft. Monmouth, N. J.*), **Turbulence in the stratosphere**. *American Meteorological Society, Bulletin*, 35(8):377-378, Oct. 1954. table. MH-BH—Four instances of considerable turbulence in the stratosphere as evidenced by the swinging of the sonde are reported. The balloons were tracked visually as well as with radio direction finding equipment. The various characteristics of the balloon flights that are relevant to estimating great velocities are described and the calculation of a gust velocity is presented. **Subject Headings:** 1. Turbulence in the stratosphere 2. Radiosonde observations 3. Gust velocities.—*I.L.D.*

6.9-204

551.551 532.517.4

Chandrasekhar, S., **A theory of turbulence**. *Royal Society of London, Proceedings, Ser. A*, 29(1176):1-19, April 5, 1955. 3 figs., table, 18 refs., 116 eqs. DWB—In this paper an attempt is made to develop a deductive physical theory of turbulence. The basic idea in this theory is the introduction of correlations in the velocity components (u_i) at two different points ($\mathbf{r}'$ and $\mathbf{r}''$ say) and at two different times (t' and t'' say). It is assumed that in stationary, homogeneous and isotropic turbulence these correlations depend, apart from the vector joining the points $\mathbf{r}'$ and $\mathbf{r}''$ only on $|\mathbf{r}' - \mathbf{r}''|$. With one additional statistical hypothesis that the fourth-order moments, $Q_{ij,kl} = \overline{u_i(\mathbf{r}', t') u_j(\mathbf{r}', t') u_k(\mathbf{r}'', t'') u_l(\mathbf{r}'', t'')}$ are related to the second-order moments, $Q_{ij} = \overline{u_i(\mathbf{r}', t') u_j(\mathbf{r}'', t'')}$ as in a joint normal distribution, a non-linear partial differential equation is derived for the defining scalar, $Q(r, t)$ ($r = |\mathbf{r}' - \mathbf{r}''|$ and $t = |t' - t''|$) of Q_{ij} . This differential equation gives precision to the idea that in some sense, the inertial and the viscous terms in the equations of motion act alike with effects which are additive. In the limiting case of infinite Reynolds number the equation for Q is discussed in some detail. It is shown how the theory enables one to follow explicitly the initial evolution of Q , if at $t = 0$, it has the form one supposes on KOLMOGOROV's similarity principles. For $t \rightarrow \infty$, it appears that the solution is separable in the variables r and t ; the nature of these solutions (which form a one-parameter family) are discussed and illustrated. **Subject Heading:** 1. Turbulence theory.—*Author's abstract.*

6.9-205

551.551:551.510.42:532.72

Gifford, Frank, Jr., **Atmospheric diffusion from volume sources**. *Journal of Meteorology*, 2(3):245-251, June 1955. 4 figs., 9 refs., 44 eqs. DWB—A general solution is given for diffusion from a volume (not point) source having spherical symmetry but an arbitrary distribution of material. Specific cases considered are an initial Gaussian distribution and a distribution with maximum concentration in a ring some distance from the center. Within 100 source widths of its place of origin the concentration of the volume cloud is significantly lower than that of a cloud from a point source. **Subject Headings:** 1. Diffusion equations 2. Explosions.—*C.E.P.B.*

6.9-206

551.551:532.517.4

Leigh, D. C. F., **The laminar boundary-layer equation: a method of solution by means of an automatic computer**. *Cambridge Philosophical Society, Proceedings*, 51(2):320-332, April 1955. fig., 3 tables, 7 refs., 20 eqs. DWB—A method, very suitable for use with an automatic computer, of solving the Hartree-Womersley approximation to the incompressible boundary-layer equation is developed. It is based on an iterative process and the Choleski method of solving a simultaneous set of linear algebraic equations. The programming of this method for an automatic computer is discussed. Tables of a solution of the boundary-layer equation in a region upstream of the separation point are given. In the upstream neighborhood of separation this solution is compared with Goldstein's asymptotic solution and the agreement is good. **Subject Heading:** 1. Turbulence theory.—*Author's abstract.*

6.9-207

551.551:533.8

Phillips, O. M., *The irrotational motion outside a free turbulent boundary*. Cambridge Philosophical Society, *Proceedings*, 51(1):220-229, Jan. 1955. 2 figs., table, 4 refs., 25 eqs. DWB—In this paper there is considered the irrotational motion of an infinite fluid when the normal velocity across a plane is specified as a stationary random function of position in the plane, and a solution is obtained in terms of the specified boundary conditions. It is shown that the mean square velocity normal to the plane is equal to the sum of the mean squares of the velocities in the other two orthogonal directions. The asymptotic variations with distance normal to the plane are found for functions representing the important properties of the motion, and, in particular, the energy of the fluctuations is shown to be inversely proportional to the fourth power of the distance from the plane. The conditions postulated are shown to correspond closely to the motion outside a free turbulent boundary, and good agreement is found between the predictions of the theory and the available experimental results. *Subject Heading: 1. Turbulence theory.—Author's abstract.*

WIND

See also: **Wind energy** (Frankenberger), 6.9-71; **Wind roses** (Holzapfel), 6.9-80; **Storm of Nov.** (Young, Howell), 6.9-157; **Evap. power** (Dammann), 6.9-230; **Fog density and wind velocity** (Kinosita), 6.9-243.

6.9-208

551.553:551.524.3 551.553:551.573

†*Schmuck, Adam, *Wiatr a temperatura i parowanie we Wrocławiu*. [Wind, temperature and evaporation in Wrocław.] *Wrocławskie Towarzystwo Naukowe, Prace*, Ser. B, No. 12, June 25, 1949. 42 p. 9 tables, 3 figs., 31 refs. On t-p: *Acta Meteorologica et Climatologica*, Universitatis Wratislaviensis. DLC—The paper, divided into two separate communications, deals with the influence of wind upon temperature variation and evaporation at Wrocław during selected months of 1946 and 1947. Relation between wind direction and temperature during July and Aug. determined by plotting thrice-daily observations of wind direction on a temperature diagram of the day, shows which winds accompany higher or lower than normal temperatures. Tables and diagrams are attached. The second communication presents evaporation data obtained by Wild's system for one half-year (summer) and analyzes the connection between wind direction and evaporation at Wrocław considering temperature, relative humidity and wind speed. Maximum evaporation occurs with SE winds. *Subject Headings: 1. Wind-temperature relationships 2. Evaporation data 3. Wind-evaporation relationships 4. Wrocław, Poland.—A.M.P.*

6.9-209

551.553.8:551.515(712)

Hage, K. D., *Study of destructive surface winds at Edmonton, Alberta*. Canada. Meteorological Division, *Local Forecast Study*, No. 27, Edmonton District; Cir-2506, Tec-189, June 25, 1954. 37 p. 6 tables, 5 figs., eqs., 16 refs., 14 graphs, 15 charts. Loose-leaf. DWB—"All cases of destructive surface winds defined as peak gust value equal to or in excess of 56 mph which occurred at Edmonton, Alberta, between 11 Oct. 1943 and 11 Oct. 1953 are tested and classified into seven types according to their principal causes. The common properties of all types are outlined and illustrated with examples." The largest number of cases and strongest winds are associated with the Maritime Arctic cold front. "An empirical method of estimating frontal gusts and peak gradient wind gusts at Edmonton is developed for this type." The other types are the trough, strong winds associated with surface lows and Maritime Arctic cold fronts, cold low, continental Arctic front, summer thunderstorm and strong wind associated with the passage of a warm type occlusion. *Subject Headings: 1. Gales 2. Fronts 3. Edmonton, Alberta.—I.L.D.*

6.9-210

551.554

Weger, Nikolaus, *Windstudien in Geisenheim am Rhein*. [Wind studies at Geisenheim on the Rhine.] *Meteorologische Rundschau*, 8(1/2):16-17, Jan./Feb. 1955. 2 tables. MH-BH—Observations are tabulated by direction for each month July 1954-Jan. 1955 of the mean velocity at 2.2 and 26 m, the ratio (around 67%) and the frequency. With absence of tur-

ulence (e.g., frosty night of Jan. 17-18) the wind at 2.2 m was the stronger. *Subject Headings:* Wind profiles 2. Geisenheim, Germany.—C.E.P.B.

SPECIAL WINDS

See also: Coastal currents (Shliamin), 6.9-56; Optical phenomena (Baratoux), 6.9-321.

6.9-211

551.555.4:551.311.12:551.573

Hoinkes, H., *Der Einfluss des Gletscherwindes auf die Ablation*. [The influence of the glacial wind on ablation.] *Zeitschrift für Gletscherkunde und Glazialgeologie*, 3(1):18-23, Dec. 1954. fig., 2 tables, 11 refs. German and English summaries p. 22. DLC—Mean temperature profiles 10-170 cm, 9-19 h over the Vernagtferner glacier at 2973 m in Aug. 1950 showed that in air flowing down the glacier (NW-N wind) temperature increases upwards by 0.45-0.57°C/m, compared with 0.20-0.28 in air blowing off the rocks (SE-S wind). At 150 m temperature is the same in both cases. The heat balance is calculated and it is shown that ablation is 5.9 cm water in 2 days of glacial wind compared with 4.4 cm with non-glacial wind. This is because owing to turbulence the temperature gradient and not the actual temperature is the important factor. *Subject Headings:* 1. Glacial winds 2. Glacier ablation.—C.E.P.B.

6.9-212

551.555.8:551.311.3:631.4

Fedorako, B. I., *Bor'ba s pylevymi buriami v stepiakh zapadnogo Predural'ia*. [Combating dust storms on the steppes of the Western Urals.] *Priroda*, Moscow, 43(9):96-97, Sept. 1954. 3 figs. DLC—Methods of combatting erosion caused by dust storms in the alkaline soil zone in Bashkir A.S.S.R. by means of forest belts, proper crop rotation and grass sowing, begun after the intense dust storms of 1935 and 1940, are described and results obtained discussed. It was observed that 3-5 year old belts curb winds and cause the formation of dust banks near the tree belts which in turn favor the development of additional root systems and promote the growth of young trees. The usefulness of protective forest belts and improved agricultural techniques was proven when a series of dust storms occurred in Bashkir A.S.S.R. due to the passage of a strong cyclone. The young tree belts resisted the dust storm on eroded areas. *Subject Headings:* 1. Dust storms 2. Soil erosion attenuation 3. Shelter belt effects 4. Bashkir, A.S.S.R.—A.M.P.

6.9-213

551.555.9(988)

Rodewald, Martin, *Die schweren "Norder" ostwärts Kap Farvel*. [The severe "norther" east of Cape Farewell.] *Wetterlotse*, No. 84/85:66-68, March 1955. 2 figs. DLC—If the steep east of East Greenland is exposed to a powerful wind from the east, the airblock produces a ridge of high pressure, out of which the wind blows as a stormy wind parallel to the coast. Typical examples illustrated are June 15, 1952 and Jan. 9, 1953 (from *Klima und Wetter Fischereigebiete West- und Südgrönland* issued by the Hamburg Seewetteramt). *Subject Headings:* 1. Norther of Greenland 2. Greenland.—C.E.P.B.

WIND EFFECTS

See also: Wind energy (Frankenberger), 6.9-71; Windmotor (Dobrosedov, Medovar), 6.9-73; Pollen studies (Wiseman, others), 6.9-136.

6.9-214

551.556:532.593

Kajiura, Syōhei and Urechino, Yoshihiko, *Forecasting of waves in the East China Sea*. *Oceanography and Meteorology*, Nagasaki, 6(2/4):123-128, Dec. 1954. 7 figs., table, 7 refs. in Japanese; English summary p. 146. MH-BH—On the basis of the marine observations in the East China Sea carried out in winter, 1952, the experimental formula evaluating the sea-surface wind from the geostrophic wind calculated from the synoptic chart was obtained. The wave height and period were evaluated from SVERDRUP's method. The values evaluated proved to agree fairly well with the actual observations. *Subject Headings:* 1. Wave forecasting 2. Wave heights 3. East China Sea.—Authors' abstract.

6.9-215

551.556:551.46

Mandelbaum, Hugo (*Dept. of Geology, Wayne Univ., Detroit*), **Wind-generated ocean currents at Amrum Bank Light Ship.** *American Geophysical Union, Transactions*, 36(1):72-86, Feb. 1955. 11 figs., 8 tables, 3 refs. **MH-BH**—A detailed study of wind generated current at a station with rotary tidal currents, based on the analyses of four-hourly observation during the years 1924-1933, was made at Amrum Bank Light vessel. The use of punch card for the harmonic analysis of such bulky information is briefly explained. A "residual current at calms" is defined and calculated to separate the wind-generated current from that caused by other forces. The wind-generated currents are calculated for winds of eight different directions. The influence of wind velocity and wind steadiness is investigated, and the functional relationship between wind and current is calculated. The water transport under various wind conditions is calculated, and finally charts are constructed which show the general current circulation in the German Bight of the North Sea at eight different wind situations. **Subject Headings:** 1. Wind driven currents 2. Punched card analysis 3. North Sea. —*Author's abstract.*

6.9-216

551.556:551.46

*Stommel, Henry (*Woods Hole Oceanogr. Inst., Mass.*), **Serial observations of drift current in the Central North Atlantic Ocean.** *Tellus*, 6(3):203-214, Aug. 1954. 6 figs., 4 tables. **MH-BH**—A series of continuous observations of wind-driven currents by means of wireless telemetering buoys, from Oct. 21, 1953 to Feb. 9, 1954 was made off Bermuda and the results summarized and actual data given for each 3-hourly observation, and drift illustrated on chart. The angle between the wind and current was found to vary from 30° to 60° with the current to the right of the wind as EKMANN discovered (1905). The angle is less for strong and greater for weak winds, though if winds are very weak or variable, the rules do not hold. Case histories show diurnal regime, as occurring on 14 separate days. They seem to be lunar not solar tidal oscillations. Ratio of current to wind speed is shown in scatter diagram for days with steady wind. **Subject Headings:** 1. Wind driven currents 2. Ekman spiral 3. North Atlantic.—*M.R.*

6.9-217

551.556.2

Fuss, F., **Untersuchungen zur Frage des Windschutzes in gärtnerischen Kulturen (Fortsetzung).** [Investigations of wind breaks in garden cultures (Continuation).] *Angewandte Meteorologie*, 2(4):97-110, Jan. 1955. figs., tables, 14 refs. **MH-BH**—Pt. 2 deals with soil temperature at Dresden at a depth of 5 cm. from 27 to 0.35 m behind a N-S windbreak of ht $h=1.5$ m. It was lowest at distance 4 h . Seasonal means, annual extremes and mean daily range in each month are tabulated. The effect of wind direction, cloud amount and rainfall on soil temperature and of rainfall on soil moisture are examined. The distribution of snow cover relative to the windbreak and its effect on soil temperature are set out. (For Pt. 1, see item 6.5-195, May 1955, *MAB*.) **Subject Headings:** 1. Shelter belts 2. Dresden Germany.—*C.E.P.B.*

6.9-218

551.556.2

Uhlig, Siegfried, **Wie bewährten sich Windschutz-Streifen in der bayerischen Hochrhön?** [How do shelter-belts work in the Bavarian high Rhön?] *Umschau*, 55(5):129-131, March 1955. 5 figs., 2 refs. **DLC**—On a gently sloping undulating region between 700 and 900 m a number of plots 250×1000 m are partly surrounded by woodland strips averaging 15 m high. The effect is shown by a chart of the areas with wind <70%, 70-100 and >100% of the wind in the open. Protection is insufficient and should be supplemented by hedges. **Subject Headings:** 1. Shelterbelts 2. Bavaria.—*C.E.P.B.*

6.9-219

551.556.3:621.311.24

Cadambe, V. (*Natl. Phys. Lab. of India, New Delhi*), **Harnessing of wind power: some technical aspects in relation to its future development in India.** *Irrigation and Power*, Simla, 11(4):528-535, Oct. 1954. 12 refs. **DWB**—Wind power utilization, investigations and projects in Vermont (1500 kw), Orkneys (100 kw), Germany (100 kw), Yalta (100 kw), Denmark (30-70 kw) and India are described. The program in India involves study of wind power for irrigation, for small scale power generation, wind surveys in selected localities, and

collection of technical data and popularization of the project. Power increases as the cube of the wind speed; hence very little is available at low wind speeds. In India highest average wind speeds are 6-10 mph whereas foreign generators are designed for 12-18 mph. Design and economic problems are discussed. Cost with small units is 4 to 7.5 d/kwh. Biggest cost is initial cost of generator; biggest problem is to provide constant output with fluctuating winds. Thorough meteorological studies must be made of sites. *Subject Headings:* 1. Wind power studies 2. Wind utilization 3. Wind generators 4. India.—*M.R.*

6.9-220

551.556.3:621.311.24

Golding, E. W., **Wind energy.** *Institution of Electrical Engineers, London, Journal*, New Series, 1(2):70-72, Feb. 1955. 4 photos. DLC—Brief history of rise and decline in the use of wind power in last 2000 years, and recent revival of interest in 30 or 40 countries which have committees to investigate use of wind. Increasing cost of fuel power generation and exhaustion of resources, plus technical developments resulting from aerodynamic studies or aeronautics have been responsible for this interest. Problems are enumerated, locations where such generation would be practicable are cited, and results of E.R.A. research in Britain mentioned. A fuller paper by the author will be read before the I.E.E. in March 1955. *Subject Headings:* 1. Wind power studies 2. Wind utilization 3. British Isles.—*M.R.*

6.9-221

551.556.3

Gordon, A. H., **Harnessing the wind.** *World Meteorological Organization, WMO Bulletin*, 3(3):102-107, July 1954. 3 figs. DWB—The general circulation is described briefly. The author then discusses wind energy, efficiency of wind turbines, the data available for calculating wind energy, survey of wind energy potentialities as indicated by favorable circulation, selection of sites, etc. and developments in the use of wind power. *Subject Headings:* 1. Wind utilization 2. Wind energy 3. General circulation.—*I.L.D.*

6.9-222

551.556.4:595.7

Ramachandra Rao, Y. (Bangalore), **An unusual appearance of desert locust swarms on the Malabar Coast in October 1952.** *Current Science*, Calcutta, 23(8):248-251, Aug. 1954. 5 figs., 2 tables, 3 refs. DLC—Carefully studying temperature and humidity conditions, barobaric charts and winds up to 3000 ft, it was concluded that the locust swarm was driven by a strong air current from deserts in northwest India over the sea and reached the west coast of south India in about 40 hours. Probable flight trajectory between 2000 and 3000 ft is shown on charts. *Subject Headings:* 1. Wind effect on locusts 2. Locusts 3. Arabian Sea 4. Malabar Coast, India.—*A.A.*

UPPER AIR WINDS

See also: **Upper winds** (Knighting), 6.9-81; **Weather phenomena** (Durward, Jones), 6.9-151; **Baroclinic structure** (McIntyre), 6.9-155; **Jet streams** (Palmén), 6.9-156; **Turbulence** (Bethwaite), 6.9-163; **Winds and temp.** (Conover, Wentzien), 6.9-190.

6.9-223

551.557:551.513

Haurwitz, Bernhard, **Zonal wind field in the upper atmosphere.** N. Y. Univ. College of Engineering. Research Div., Contract AF 19(122)-49, Scientific Report, No. 7, Feb. 1954. 10 p. 2 figs., table, 14 refs. DWB—Two tentative meridional cross sections are given, showing the zonal wind components in the Northern Hemisphere during summer and winter between 30 and 90 km elevation. *Subject Headings:* 1. Zonal wind components 2. Meridional cross sections.—*Author's abstract.*

6.9-224

551.557:629.13

Meeker, Ralph I., Jr. (American Airlines, Inc., Los Angeles), **A simple rapid method for approximating least time flight tracks.** Jan. 25, 1954. 6 p. 5 figs. Minco. DWB—A bi-polar radial grid is presented for computing ground speed and time without scaling off mileages over several or many possible routes in order to select the best one. The use of this grid, as well as its construction, is explained and an example given for flight from Los Angeles to Idlewild. In addition to the grid, a wind component computer and speed-time chart are

required. The grid is drawn on the underside of transparent plastic so marks can be made on the front of the sheet and then erased. *Subject Headings:* 1. Optimum flight paths 2. Air navigation tools 3. Templates.—*M.R.*

6.9-225

551.557.3:533.6:551.551

Hutchings, J. W., *Turbulence theory applied to large-scale atmospheric phenomena. Journal of Meteorology*, 12(3):263-271, June 1955. 5 figs., 3 tables, 14 refs. DWB—It is shown from a consideration of recent developments of turbulence theory, especially KOLMOGOROV's, that there is a range of large eddies dominated purely by inertial forces. The correlation functions in these are defined. High-level synoptic charts show features of huge-scale turbulent flow. Correlations with lag 6-48 hrs for Larkhill (500 mb) and Auckland (30,000 ft) for longitudinal and lateral flow fit well enough with the theoretical power relation. Autocorrelation coefficients of pressure at Buenos Aires with lag 1-120 hrs fit the 4/3 power law up to 60 hrs. For pressures at Wellington, 500 mb levels and temperature at Larkhill the fit is less good. *Subject Headings:* 1. Turbulence theory 2. Upper air wind variations.—*C.E.P.B.*

VERTICAL CURRENTS

See also: Precip. forecasting (Collins, Kuhn), 6.9-125; Vertical eddy-flux (Hutchings, Farkas), 6.9-145; Lee waves (Wallington), 6.9-169; Variable heating (Malkus), 6.9-251.

6.9-226

551.558.1:797.5

Faggi, Osvaldo D., *Tres años de térmica. [Three years of thermals.] Revista Nacional de Aeronáutica*, Buenos Aires, 14(152):85-86, Nov. 1954. photos, tables. DWB—Sketch of the sport of gliding in Argentina from its inception about 1947, its lapse, and resurgence in 1951 on a permanent and sustaining basis. Cites various records attained in Argentina. Mentions aid rendered by gliders in the investigations of such Argentine meteorologists as GEORGII, ROVESTI and PICCHIO on the presence of upper atmosphere currents over Córdoba and their relation to the Zonda wind in the Cordilleras; also their investigations of the periodicity of waves in Central Argentina in relation to the South Polar air masses. *Subject Headings:* 1. Thermals 2. Gliding 3. Argentina.—*D.M.G.*

6.9-227

551.558.21

Radok, Uwe (*Univ. of Melbourne, Victoria*), *A procedure for studying mountain effects at low level. American Meteorological Society, Bulletin*, 35(9):412-416, Nov. 1954. 4 figs., 7 refs., 5 eqs. MH-BH—A representative picture, from the aeronautical point of view, of vertical currents above mountainous country is obtained by letting these currents act on an aircraft set to fly horizontally in still air. Pressure and temperature traces recorded by such an aircraft give the effective vortical velocities and some idea of the temperature lapse rate in the undisturbed stream. Two sets of results are given for illustration. One shows low-level lee waves which were caused presumably by a temperature inversion; the other is a case of strong turbulence side by side with a smooth wave, in which downdrafts reached 1600 ft/min in an 18 knot wind. *Subject Headings:* 1. Orographic effects 2. Vertical currents 3. Lee waves 4. Atmospheric turbulence 5. Downdrafts.—*Author's abstract.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

HUMIDITY

See also: Radiosonde comparison (Hering), 6.9-191.

6.9-228

551.571:551.511

Benton, George S., *Water vapor transport project. Johns Hopkins Univ. Dept. of Civil Engineering, Contract AF 19(122)-365, Quarterly Reports, No. 1, 3, 6, 8-10, Oct. 15-Dec. 15, 1950, March 15-June 15, 1951, Dec. 15, 1951-March 15, 1952, June 15-Sept. 15, 1952, Sept. 15-Dec. 15, 1952, Dec. 15, 1952-March 15, 1953. 6 pieces. figs., tables, eqs. DWB—*

A comprehensive punched card project, computing the divergence fields for water vapor transport by line integration over U. S. A. and Canada with due regard to the complete energy balance equation and extending the study also to large scale turbulence phenomena, was carried out. The quarterly administrative reports summarize the scientific aspects and progress, partly in appendices; the more complete scientific results are given in Technical Reports. (See also 5.1-122, Jan. 1954, *MAB.*) *Subject Headings:* 1. Water vapor transport 2. Large scale eddies 3. Ohio River Basin 4. North America. I. Carnahan, Robert L. II. La Seur, Noel E.—A.A.

6.9-229

551.571:628.8

Landsbaum, E. M.; Dodds, W. S. and Stutzman, L. F. (all, *Northwestern Univ., Evanston, Ill.*), Humidity of compressed air. *Industrial and Engineering Chemistry*, Wash., D. C., 7(1):101-103, Jan. 1955. graph, 18 refs. DWB, DLC—Nomogram for calculations and design of dehumidification equipment, giving equilibrium water content of air as a function of temperature and pressure. Articles relating to this subject are listed in bibliography. Chart covers $T=50^{\circ}\text{F}$ to 200°F , and $P=1$ to 10^3 atmospheres. Relations of water vapor to other compressed gases are also discussed. Dew points can be calculated as well as water content in lbs. of $\text{H}_2\text{O}/\text{lb. air}$. Copies of the chart are for sale by the Library of Congress Photoduplication Service for \$1.25 each. *Subject Headings:* 1. Humidity 2. Water content of compressed air 3. Air conditioning.—M.R.

6.9-230

551.571.34:551.573:551.552(434.6,435.25)

Dammann, Walter (*Frankfurt*), Säkulare Schwankungen der Verdunstungskraft. [Secular variations of the evaporative power.] *Die Wissenschaft*, Stuttgart, 45(6):144-146, March 1955. 2 figs. DLC—Sixty year (1890-1950) records of saturation deficit, temperature and cloudiness at Karlsruhe and Bremen in July and Aug. are plotted by 5-year overlapping means to show secular variations of these elements and their interrelationships. The wind direction and wind speed frequencies with high and low saturation deficit are tabulated and show great differences between east and west wind conditions but surprisingly small differences with wind speed. So secular changes in wind speed shouldn't make much change in dryness, but directional shifts would. Saturation deficit and temperature have been increasing since 1920. *Subject Headings:* 1. Saturation deficit 2. Long period variations of potential evaporation 3. Karlsruhe, Germany 4. Bremen, Germany.—M.R.

EVAPORATION AND EVAPOTRANSPIRATION

See also: Evapotranspiration (Mather), 6.9-110; Wind, temp. and evap. (Schmuck),

6.9-208; Glacial wind (Hoinkes), 6.9-211.

6.9-231

551.573:551.577:551.585

Crowe, P. R., The effectiveness of precipitation. A graphical analysis of Thornthwaite's climatic classifications. *Geographical Studies*, London, 1(1):44-62, 1954. 4 figs., 4 tables, not-refs. MH-BH—A critical study of THORNTWHAITE's classification formulas of 1931 and 1948. The value of his $P-E$ index (1931) is limited by the probable errors of P and T , and alternative simpler formulas such as $E=(T-10)/9$ give equally good results. Potential evapotranspiration (1948) also meets difficulties, particularly in the uncertainty of figures of evaporation, and its basis is illogical. THORNTWHAITE's treatment of insolation is incomplete. A number of curves of potential evaporation are redrawn on simple numerical scales. THORNTWHAITE's systems are stimulating but not final. *Subject Headings:* 1. Thornthwaite's classification 2. Precipitation effectiveness.—C.E.P.B.

6.9-232

551.573

*Gilbert, M. J. and van Bavel, C. H. M. (*N. C., Agric. Experm. Stations*), A simple field installation for measuring maximum evapotranspiration. *American Geophysical Union, Transactions*, Pt. 1, 35(6):937-942, Dec. 1954. 2 figs., 4 tables, 6 refs. MH-BH—Soil-filled gasoline drums (55 gal) have been used to measure maximum evapotranspiration at Waynesville, N. C. Installation involves no mechanical devices, and maintenance is at a minimum. Water is added manually to prevent water supply to the plants from becoming a limiting

factor. Tensiometers are used to indicate when water must be added. Tanks are placed in the center of areas of the same vegetation. Data for one year under grass cover are presented and compared with values calculated from THORNTHWAITE's and PENMAN's formulas. The latter appears, upon statistical analysis, to fit the data better than the former. *Subject Headings: 1. Maximum evapotranspiration 2. Evapotranspiration measurement 3. Waynesville, North Carolina.—Authors' abstract.*

6.9-233

551.573

Hanyu, Jyuro and Tsugawa, Kiyoharu (*Aomori Agric. Exper. Sta.*), **A measurement of evaporation from the irrigated paddy field and absorption of water by the paddy rice.** *Journal of Agricultural Meteorology*, Tokyo 9(3/4):119-120, Aug. 1954. 2 figs., table, 5 refs. In Japanese; English summary p. 120. **MH-BH**—Using the apparatus of Fig. 1, authors measured the amount of evaporation from the irrigated paddy field and absorption (transpiration) of water by the paddy rice in each growing period for 1953. These results are shown in Table 1 and Fig. 2. The absorption was slight at first and reached maximum at the beginning of young panicle formation. The evaporation in the paddy field was nearly equal to the evaporation in the observation field at first, but the former gradually had less than the latter. *Subject Headings: 1. Evaporation measurements 2. Rice paddies 3. Transpiration.—Authors' abstract.*

6.9-234

551.573 551.579

Keller, R., **Zum Wasserverbrauch von Vegetation und Wirtschaft.** [Water consumption of vegetation and economy.] *Erdkunde*, Bonn, 2(1/3):93-100, 1948. 14 refs., table. **DLC**—Review of basic methods for the determination of evapotranspiration (hydrologic equation, lysimeters, physiological and climatological methods). A few data are given for the transpiration of trees and plant associations. The evaluation of the components in the hydrologic cycle is shown and the water consumption of population and industry discussed. *Subject Headings: 1. Evapotranspiration 2. Hydrologic cycle 3. Rhine Basin, Germany.—A.A.*

6.9-235

551.573:551.571

Kucera, C. L. (*Dept. of Botany, Univ. of Missouri, Columbia*), **Some relationships of evaporation rate to vapor pressure deficit and low wind velocity.** *Ecology*, 35(1):71-75, Jan. 1954. fig., 2 tables, refs. **DWB**—A study was conducted during July and Aug. 1951 and Aug. 1952 at Columbia, Missouri, using Livingston-type atmometers to determine evaporation rates with various moisture and wind conditions, day and night, in open sunlight and in a hickory grove. Means rates are tabulated and all data plotted on scatter diagrams and segregated according to wind speed classes (using vapor pressure difference against evaporation, as arguments). Evaporation coefficients are given for each regression line and for the mean condition for all wind speeds. It was found that evaporation is a function of vapor pressure difference except under nocturnal inversion conditions. Correlation of evaporation rate to vapor pressure difference was >70%. Wind speed was not highly correlated, but narrowed the variance. *Subject Headings: 1. Evaporation rate 2. Vapor pressure deficit 3. Columbia, Missouri.—M.R.*

6.9-236

551.573:551.579

Stanhill, G. (*Natl. Vegetable Res. Sta., Wellesbourne*), **Evaporation of water from soil under field conditions.** *Nature*, London, 176(4471):83, July 9, 1955. 2 figs., 5 refs. **DWB**—Comparison of evaporation from soil and water under identical conditions showed two stages. In the first soil loss equalled water loss; in the second it became progressively less. This was due to limitation of capillary movement, which depends on soil structure. Progress of drying in a seed bed was followed to a depth of 3 in. *Subject Heading: 1. Evaporation from soil.—C.E.P.B.*

6.9-237

551.573

Thornthwaite, Charles W. (*Lab. of Climatology, Seabrook, N. J.*), **Table for determining monthly rates of unadjusted potential evapotranspiration.** (1953?) 2 p. (fold.) Photostat of typescript. **DWB**—Potential evapotranspiration with two decimals is given versus tem-

perature (up to 26.5°C with intervals of 0.5°C) and [thermal efficiency] T (from 20 to 172.5 units with intervals of 2.5). No explanation is given. *Subject Headings: 1. Potential evapotranspiration 2. Meteorological tables.—A.A.*

CONDENSATION

See also: Special bibliography on Nuclei in the Atmosphere, p. 1307.

6.9-238

551.574.1:539.5

*Butkovich, T. R., **Hardness of single ice crystals.** *U. S. Snow, Ice and Permafrost Research Establishment, Research Paper, No. 9, May 1954.* 11 p. 13 figs., tables, 5 refs. **MH-BH**—The Brinell and Microcharacter methods for determining hardness of single ice crystals are described and the results of experiments with the Olsen Baby, Brinell Hardness Tester and the Spencer Microcharacter are presented. The results of measurements show that the "hardness of single ice crystal increases with decreasing temperature." The temperature dependence of the scratch hardness resembles that of the Brinell hardness. An anisotropism of hardness is observed. The measurements are presented in tables. *Subject Heading: 1. Ice crystal hardness.—I.L.D.*

6.9-239

551.574.1

Gillespie, G. R. and Johnstone, H. F. (*Univ. of Ill.*), **Particle-size distribution in some hygroscopic aerosols.** *Chemical Engineering Progress*, Philadelphia, 51(2):74F-80F, Feb. 1955. 7 figs., 3 tables, 15 refs., eqs. **DLC**—The selection and design of aerosol-removal equipment depend largely on knowledge of the size of the particle. In the present work the distribution of particle sizes of aerosols of sulfuric, phosphoric, hydrochloric and hydrobromic acids, etc. was measured by means of a four-state high velocity jet impactor. The effect of the relative humidity of the air stream, the addition of foreign nuclei, the concentration of the aerosol particles and time on the size distribution was studied. The aerosol was formed almost instantaneously by the rapid and continuous mixing of a hygroscopic vapor with a moist air stream. The particles attained equilibrium with their surroundings in a fraction of a second by taking up water vapor. If the number concentration was greater than 10^6 particles/cc, the particles continued to grow by coagulation. The particle size, which ranged between 0.1 and 6.0 μ diam., appeared to depend primarily on the method of formation of the nucleus. The size distributions followed the log-probability function from which the number of particles per unit volume of gas was obtained. The jet impactor was shown to be readily adaptable to field work. Samples of sulfuric acid mist from the waste gases of a contact-acid plant showed the particle-size distribution to be nearly identical with distributions made from sulfur trioxide and water vapor under similar conditions in the laboratory. *Subject Headings: 1. Aerosol size distribution 2. Jet impactors.—Authors' abstract.*

6.9-240

551.574.1

McCully, C. Roland and Langer, Gerhard, **A laboratory study on the washout of suspended dust particles by falling water drops.** *Armour Research Foundation, Chicago, Contract AF 19(122)-472, Project C 022, Scientific Report, No. 14, Sept. 24, 1954.* 43 p. 14 figs., 8 tables, 11 eqs. **MH-BH**—This study consists of an investigation of the striking probability for collisions between drops and particles including a theoretical investigation of the effects of interfacial tension upon striking probability, observation of collision phenomena and the photographing of these phenomena; washout studies conducted in a small glass column, in a 20 in. diameter column and in an aerosol chamber. The apparatus and procedure are illustrated with diagrams and photographs and the data are presented in tables and graphs. *Subject Headings: 1. Dust particle washouts 2. Water drops.—I.L.D.*

6.9-241

551.574.4(569)

*Gilead, M. and Rosenan, N., **Ten years of dew observation in Israel.** *Israel Exploration Journal*, 4(2), 1954. 4 p. 3 tables, 5 refs. **DLC**—Observations with Duvdevani dew gages in Palestine now cover 5 years. The annual variation of frequency and amount is set out, and the effect of location and soil described. *Subject Headings: 1. Dew data 2. Israel.—C.E.P.B.*

6.9-242

551.574.7:629.3

Coles, Willard D. (*Lewis Flight Propulsion Lab., Cleveland*), **Icing and wet-surface temperature variation for two airfoil shapes under simulated high-speed flight conditions.** *U. S. NACA Technical Note*, No. 3396, Feb. 1955. 33 p. photos, diagrs. DWB—The variation of wet-surface temperature and the conditions that will result in ice-free surfaces for high-speed flight through clouds were investigated experimentally. The results are compared with calculated values obtained with an analytical method. The analytical results were generally conservative, giving wet-surface temperatures 2° to 4°F lower than the experiments and predicting the formation of ice at values of ambient-air temperature up to 12°F higher than the experiments. The location of analytically determined critical regions on the bodies for the initial formation of ice was experimentally substantiated. *Subject Heading: 1. Icing on aircraft.*—*NACA abstract.*

FOG

6.9-243

551.575:551.5

Kinosita, Seiiti, **On the variations of fog density and wind velocity.** *Low Temperature Science, Sapporo, Japan, Ser. A, Physical Sciences*, 11:55-61, 1953. 7 figs., 5 refs., 9 eqs. In Japanese; English summary p. 61. DWB—The fog carried by wind over the land is never homogeneous in its density. This inhomogeneity is presumably connected with physical properties of air such as wind velocity, air temperature, relative humidity, etc. The author measured the temporal variations of fog density as well as those of wind velocity at the same spot with the hope of finding a correlation between them. The fog density was determined by measuring the transmission of a light beam sent forth from an artificial light source into the fog. The density of fog was represented by the extinction coefficient σ averaged along the path of the light beam. The measurement of wind velocity u was made by a hot-wire anemometer. From the observation made on July 21st, 1952, at Akkeshi, the following statistical quantities were obtained over the whole period of observation (77 sec): The mean values:

$\bar{\sigma} = 9 \times 10^{-1} / \text{cm}$; $\bar{u} = 2.2 \text{ m/sec}$; The relative variances: $\frac{\sqrt{\Delta\sigma^2}}{\bar{\sigma}} = 0.49$; $\frac{\sqrt{\Delta u^2}}{\bar{u}} = 0.32$; The correlation

coefficients: $r = 0.26$; The auto-correlations: $R_\sigma(\tau)$, $R_u(\tau)$. When the correlation is taken not over the whole period of observation but in a restricted portion of it, where the variation of σ and u are large as compared with those in the remaining portion, the correlation coefficient turns out to be 0.42. Therefore, the correlation between fog density and wind velocity tends to increase in magnitude as the degree of turbulence of the wind is increased. *Subject Heading: 1. Fog density 2. Wind velocity 3. Fog measurement 4. Wind measurement 5. Akkeshi, Japan.*—*Author's abstract.*

6.9-244

551.575:551.584.4

Yosida, Zyungo, **Distribution of fog density in a forest.** *Low Temperature Science, Sapporo, Japan, Ser. A, Physical Sciences*, 11:1-6, 1953. 3 figs., ref., 12 eqs. In Japanese; English summary p. 6. DWB—On the assumption that the vertical motion of a fog particle caused by turbulence of air in the forest is the same as the so-called one-dimensional "random walk," the vertical distribution of fog particles in the forest is deduced theoretically, with the result that the fog density diminishes exponentially downwards. *Subject Headings: 1. Fog density 2. Fog distribution 3. Forest influences.*—*Author's abstract.*

6.9-245

551.575.1(5)

Nakahara, H., **On the fog at Aikawa, Pt. 1.** *Journal of Meteorological Research*, Tokyo 6(1/3):60-64, March 1954. 4 figs., 10 refs., 4 eqs. In Japanese; English summary p. 66. MH-BH—In the present paper the mechanism of fog formation is investigated. The fog formation in question is due to decreasing of the height of stratus resulting from cooling of the layer by a convection process which prevails in the upper friction layer with radiational cooling in the same way as PETTERSEN's investigation of fog on California coast. *Subject Heading: 1. Fog formation 2. Aikawa, Japan.*—*Author's abstract.*

6.9-246

551.575.4:551.584.4

Kuriowa, Daisuke, **The turbulent diffusion of fog water near the ground and the fog preventing effect of an artificial model forest.** *Low Temperature Science, Sapporo, Japan*

Ser. A, Physical Sciences, 11:39-53, 1953. 7 figs., table, 6 refs., 16 eqs. In Japanese; English summary p. 53. **DWB**—In this paper, the vertical distribution of fog water content near the ground and the fog-preventing effect of an artificial model forest are described. In Pt. I, the vertical distribution of fog water content near the ground was formulated on the assumption that the mechanism of the diffusion of fog particles is the same as that of momentum-diffusion of air. The profile of fog water content was found to be given in terms of the vertical distribution of mean wind velocity and the temperature gradient near the ground, and was represented completely by a logarithmic function of the height from the ground surface in the case of "adiabatic condition." Further from the direct measurement of the amount of fog water computed by earth's surface, the heat quantity transferred from the surface to air was derived. In Pt. II, the fog-preventing effect of an artificial model forest was discussed by making use of the data concerning the vertical distribution of fog water. *Subject Headings*: 1. Vertical distribution of fog 2. Fog prevention forests 3. Forest influences.—*Author's abstract*.

CLOUDS

See also: Insolation (Neumann), 6.9-175.

6.9-247

551.576:551.594.5

*McQuistan, G. W. and Frankpitt, B. L., **Night cloud cover in New Zealand and its effect on auroral frequencies**. Wellington, New Zealand. Carter Observatory, Contract AF 64(500)-1, Scientific Report, No. 5, 1954. 9 p. tables. **MH-BH**—The diurnal, seasonal and regional variation in cloud cover is determined from 15 stations in New Zealand and Campbell Island ranging from 35° to 53°S lat. using records for 1950-1954, and the possible effect on auroral frequencies observed in New Zealand evaluated. Observations and methods of reduction of data are described. Total cloud cover and cloud cover over the SE to SW sector up to 45° elevation angle are used as criteria. Diurnal variations should not affect observation of aurora, but seasonal and regional variations are substantial. Cloudiness is at a maximum in Oct. and in the south (West Coast) and a minimum in Sept. and in the north and on East Coast. No difference is found in whole sky and south sector variations. Table gives % frequency of cloudy nights in each month and for each station. Finally, the effect of partly cloudy and cloudy sky on actual frequency of aurora observed is worked out mathematically for general use anywhere. *Subject Headings*: 1. Cloud frequency data 2. Auroral-cloudiness relationships 3. Auroral frequencies 4. New Zealand.—*M.R.*

6.9-248

551.576.1:629.135.2

Dunning, Hal H. and La Seur, N. E. (*Fla. St. Univ., Tallahassee*), **An evaluation of some condensation trail observations**. *American Meteorological Society, Bulletin*, 36(2):73-79, Feb. 1955. 4 figs., table, 11 refs. **MH-BH**—Observations made on ten routine B-47 training missions are used to evaluate present theoretical work on formation of exhaust condensation trails, and these observations are then correlated with the structure of the upper troposphere and lower stratosphere, to determine synoptic features typically associated with favorable and unfavorable conditions for trail formation. For the altitudes considered broad areas of trail formation were found to occur only between the polar front and the sub-tropical jet streams. Broad areas unfavorable to trail formation were found to be located on the cyclonic shear side of the polar front jet and on the anticyclonic shear side of the subtropical jet. Agreement between these observations and theory is good. *Subject Headings*: 1. Condensation trail observations 2. Condensation trail formation.—*Author's abstract*.

6.9-249

551.576.1:629.135.2

U. S. Air Weather Service, **Memorandum on effect of engine power setting on contrail formation and intensity**. Its *AWS Technical Report*, 105-126, Aug. 1954. 6 p. graph, 3 tables, 2 refs. **DWB**—It has frequently been suggested that the formation of condensation trails might be prevented or at least their intensity decreased by varying the engine power setting. In a paper by APPLEMAN it was shown theoretically that power setting should not affect the probability of contrails but might affect their persistence and intensity. A test of this theory has been made using the results of nearly 2000 observations by F-84 aircraft. It was found that changing power setting had absolutely no effect on contrail frequency,

but that an increased setting may result in slightly denser trails. *Subject Headings: 1. Condensation trail formation 2. Condensation trail prevention.—Author's abstract.*

6.9-250

551.576.11:629.1

Kraft, Christopher C., Jr., **Flight measurements of the velocity distribution and persistence of the trailing vortices of an airplane.** *U. S. NACA, Technical Note, 3377, March 1955.* 32 p. 10 figs., 4 refs. **DWB**—Measurements have been made in flight of the velocity distribution and persistence of the trailing vortices of a propeller-driven fighter-type airplane. The vortices were marked in the atmosphere with smoke and were penetrated by a jet airplane equipped with a high-frequency angle-of-attack vane and a sensitive total-pressure instrument. Photographs of the trailing-vortex filaments were also made. *Subject Headings: 1. Condensation trails 2. Visible vortices 3. Wind velocity distribution measurements.—Author's abstract.*

6.9-251

551.576.11:551.558.

Malkus, Joanne Starr, **On the isolation of tractable problems and an example in variable heating.** *Science Progress, 43(171):461-475, July 1955.* 7 figs., 2 plates, 9 refs., eq. **DWB**—First describes a small flat island as a meteorological laboratory for the study of convection. Formation of a "cloud street" of detached cumuli is analyzed hydrodynamically, the interacting scales of motion being a uniform basic motion, organized convective motions and thermal turbulence. The basic equation is $F\left(\frac{gs}{U^2}, w\right) = G\left(H, \frac{gs}{U^2}\right)$, where $\frac{gs}{U^2}$ describes the basic current and H is the heating function. Calculated streamlines are shown and are analogous to flow over a mountain barrier. The application of H is discussed. Results include the solution of the sea-breeze problem, and the structure of the trade wind. The latter is illustrated by the circulation over Puerto Rico, giving a convective cell with cloud over the island surrounded by a clear ring due to subsidence. *Subject Headings: 1. Convection over heated island 2. Cumulus cloud formation.—C.E.P.B.*

6.9-252

551.576.2(791):521.

*Smith, Harlan J. and McCrosky, Richard E., **Astronomical observing conditions in the Southwest.** Harvard Univ. Observatory, Contract N5ORI-07647, (unnumbered report), Feb. 1953. 24 p. 12 figs., 4 maps (fold.), 2 tables. Photostat. **DWB**—Ignoring other factors contributing to good or bad astronomical observing conditions (especially for meteorological observation and photography), the authors have made a detailed study of nighttime cloud cover frequency over the Southwest United States to determine the most suitable spot for an observatory. The Southeastern States were excluded because of generally cloudy summer and the far West and Northern States because of cloudy winters. Great local differences appear on the isarithm charts which are drawn for Southern Calif., Ariz., and N. Mex. (based on synoptic weather data for 20 stations for 1939-46). The region within 100 m. around Yuma, Ariz., is shown to be the best on the average, with 6.8 hours per night clear ($\geq .1$ cirrus). Transparency or visibility data were not available or were considered unusable for the purpose of this study. *Subject Headings: 1. Astronomical sites 2. Astronomical weather observation 3. Nocturnal cloudiness 4. Yuma, Ariz.—M.R.*

PRECIPITATION

See also: Farm irrigation (Nakahara, others), 6.9-68; *Rain-gauge disposition* (Higashi), 6.9-79; *Fire-weather forecasts* (Schroeder), 6.9-127; *Tropical disturbances* (Ramage), 6.9-161; *Precip. effectiveness* (Crowe), 6.9-231; *Hydrol. year-book* (Israel), 6.9-272; *River discharge* (Reinhold), 6.9-277; *Weather conditions*, 6.9-300.

6.9-253

551.577.1:551.515.2:546.1

Miyake, Y. and Sugiura, Y., **The chemical studies of rain water accompanied by a typhoon.** *Geophysical Magazine, Tokyo, 26(1):29-34, Aug. 1954.* 3 figs., 4 tables, 8 refs., 5 eqs. **DWB**—Authors propose mathematical expressions representing the mechanism which causes variations in the chloride and sulphate content of rain during typhoons. Results of the formulas are found to be in good agreement with the observed fact that in rainfall during

typhoon "the chlorinity ratio of sulphate decreases with increasing chlorinity of water, down to even below the sea water value, and the time of its minimal value often coincides with that of the maximum value of the chlorinity." *Subject Headings:* 1. Chemical composition of seawater 2. Typhoon effects on rainfall 3. Chlorinity.—G.T.

6.9-254

551.577.2(46)

*Dué Rojo, Antonio (*Dir. Cartuja Observatory*), *La precipitación atmosférica en el Observatorio de Cartuja, 1902-1951*. [Atmospheric precipitation at the Cartuja Observatory, 1902-1951.] *Granada. Observatorio de Cartuja. Trabajos Científicos*, 6(44), 1952. 12 p. 2 figs., 2 tables, refs. Also appeared in: *Urania*, Barcelona, No. 229, [1951?]. DWB—Data presented and analyzed in this study cover annual march of total precipitation, and frequency distribution of various types of hydrometeors. From a seven-year periodicity found in the recurrence of dry years a drought is predicted for 1952. Precipitation in Cartuja found to show a regular excess in comparison to other nearby localities. *Subject Headings:* 1. Precipitation data 2. Precipitation distribution 3. Precipitation periodicities 4. Cartuja Observatory, Granada, Spain.—G.T.

6.9-255

551.577.2(667)

Hubbard, J. H., *A note on the rainfall of Accra Gold Coast*. *Geographical Studies*, London, 1(1):69-75, 1954. 3 figs., foot-refs. MH-BH—Annual rainfall 27.24 in. (range 1888-1920, 8.15-44.20) mainly in April-June and Oct. but with great variations. It falls mainly in a few wet days. Mean annual deviation 27%. Monthly frequencies are shown in diagram. The long dry season is attributed to the absence of forced uplift and the shallowness of the layer of equatorial maritime air overlain by harmattan. *Subject Headings:* 1. Rainfall data analysis 2. Accra, Gold Coast.—C.E.P.B.

6.9-256

551.577.34:551.513

Dingle, A. Nelson, *Patterns of change of precipitation in the United States*. *Journal of Meteorology*, 12(3):220-225, June 1955. 7 figs., 7 refs. DWB—Ten-year moving averages of precipitation 1880-1950 for 28 stations in U. S. are used to construct maps of interdecadal changes at 5-year intervals. These are interpreted in terms of circulation patterns and cyclonic activity. *Subject Headings:* 1. Atmospheric circulation 2. Precipitation trends 3. United States.—C.E.P.B.

6.9-257

551.482:551.577.34:551.583.3

Dury, G. H., *Bed-width and wave-length in meandering valleys*. *Nature*, London, 176(4470):31-32, July 2, 1955. 2 figs., table, 4 refs. DWB—Putting W =minimum width of channel and L =wave-length of valley meanders, both in feet, and M area of catchment in sq mi, $W=43 M^{0.43}$ and $L=560 M^{0.43}$. This indicates that in catchments 4-63 sq mi in England bank-full discharge varies with catchment area. The contrast between present river channels and meanders and those of valleys indicates a marked reduction of flow since Pleistocene. *Subject Headings:* 1. Rainfall variations 2. Quaternary climates 3. Rivers.—C.E.P.B.

6.9-258

551.577.34(43)

Schirmer, H., *Änderung der sommerlichen Niederschläge in Deutschland*. [Change of summer rainfall in Germany.] *Umschau*, 54(11):325-326, June 1, 1954. 2 figs., table, 9 refs. DLC—Variations of rainfall in May through July are shown year by year for 1891-1944 in Weser-Ems, Hesse and Bodensee Regions, and also % frequencies of different amounts for 1891-1916 and 1917-44. In the first period totals above average predominated; in the second, totals below average, except in Bodensee. Other parts of the world show similar climatic changes beginning about 1916-1920. *Subject Headings:* 1. Rainfall trends 2. Germany.—C.E.P.B.

6.9-259

551.577.36

*Balasubramaniam, C.; Krishnan, K. A. and Baktavatsalu, C. M. (*Agric. Met. Sec., Bangalore*), *Fiducial limits of monthly rainfall at the Agricultural Research Station, Lam*

Farm (Guntur). *Science and Culture*, 20(3):112-116, Sept. 1954. 3 figs., 4 tables, 2 refs. DWB—A knowledge of fiducial limits of expected monthly rainfall is a pre-requisite for successful crop production. The method of analyzing the rainfall data statistically, to arrive at the fiducial limits of expected monthly rainfall is presented here. The fiducial limits of expected monthly rainfall data of the Agricultural Research Station, Lam, are determined. *Subject Headings*: 1. Statistical studies 2. Rainfall frequencies 3. Guntur Farm, India.—*Authors abstract*.

6.9-260

551.577.36:519.

*Srinivasan, T. R. (*Met. Office, Poona*), Sequence of months with rain above and below average in Rayalaseema considered in relation to the theory of probability. *Indian Journal of Meteorology and Geophysics*, Delhi, 5(3):230-238, July 1954. figs., 5 tables, 4 refs., 3 eqs. MH-BH—Monthly rainfall over a period of 60 years (1891-1950) in Rayalaseema has been analyzed. The averages of the 12 months were determined and the sequences of months with rain above and below average (designated as A and B), respectively, studied. It is found that an empirical relationship of the form $\log F = nR + S$ (where R and S are constants) exists between n the length of the run or sequence and F the cumulative frequency of runs of length n and more. After performing the contingency test for the independence of the nature of consecutive months an approach based on the theory of probability is made and a justification for the observed logarithmic relation obtained. *Subject Headings*: 1. Statistical studies 2. Rainfall frequencies 3. Rayalaseema, India.—*Author's abstract*.

6.9-261

551.577.37:551.583.3(661)

Büdel, Julius, Reliefgeneration und plio-pleistozäner Klimawandel im Hoggar-Gebirge Zentrale Sahara. [Relief generation and plio-pleistocene climatic change in the Hoggar Mountains, central Sahara.] *Erdkunde*, Bonn, 9(2):100-115, May 1955. 6 figs., 19 refs. French summary p. 100, German p. 114. DWB—Three periods of humid climate have occurred in the Hoggar district. The first, in the early Tertiary, lasted at least 10 million years and formed an extensive peneplane; it was tropical with a rainy season of at least 5 months caused by the advance of the monsoon front 1200 km or more to the north, alternating with a long dry season. The second lasted some tens of thousands of years probably at the maximum of the Riss; it had a wet tropical climate without a dry season. Rainfall is estimated as nearly 1000 mm in the High Hoggar and 500 mm in the surrounding hills. The third, in the Neolithic was short and unimportant. Between these rainy periods the climate was mainly desert. *Subject Headings*: 1. Pluvial periods 2. Hoggar Mountains, Sahara.—*C.E.P.B.*

6.9-262

551.577.37:551.577.61

Kortüm, Fr., (*Humboldt-Univ., Berlin*), Das Unwetter am 23.5.1950 in Bruchstedt/Thür [The storm of May 23, 1950 in Bruchstedt, Thuringia.] *Zeitschrift für Meteorologie*, 8(7/8):204-209, July/Aug. 1954. 3 figs., 10 refs. German summary p. 204. MH-BH—The author describes the geology of the Thuringian basin, the Heilinger heights and the Wilde Graben, and the geography of Bruchstedt where the catastrophe occurred, the synoptic situation at the beginning of the third May decad (May 23, 1950) and the course and causes of the catastrophe in which heavy rainfall and hail caused loss of human life and of animals and damage to crops. *Subject Headings*: 1. Storm rainfall 2. Storm damage 3. Bruchstedt, Thuringia.—*I.L.D.*

6.9-263

551.577.37:551.579.4(52)

*Osaka, Japan. Meteorological Observatory, Report of investigation on the damage caused by violent floods in Southern Kinki District in July 1953. *Japan. Central Meteorological Observatory, Tokyo, Memoirs*, 38(3/4):359-384, July 1954. In Japanese; legends and summary in English. 17+figs., 5 tables. DWB—The heavy rainfall of July 17-18, 1953 over the Kii Peninsula, which caused record-breaking disastrous floods in Wakayama Prefecture, is investigated. In addition to tabulated daily and hourly rainfall amounts for stations in the affected area, and charts of daily rainfall distribution, the analysis includes isochrones for beginning, ending and duration of heavy rainfall, maximum amounts for selected stations, water levels, flood data, etc. A surface weather map and aerological data (tem-

perature and mixing ratio) are also presented as well as two graphs: (1) relationship between hourly rainfall amounts at Sarutani and the distance from the line of discontinuity and (2) vertical distribution of rainfall caused by orographic effect. *Subject Headings:* 1. Record rainfall 2. Floods 3. Rainfall amount 4. Rainfall distribution 5. South Kinki District, Japan.—G.T.

SNOW AND HAIL

See also: Snow and Ice Commission (IUGG), 6.9-25; Compos. of precip. (Emanuelson, others), 6.9-130; Snow limits and thickness patterns (Lamb), 6.9-193; Sound absorption (Ishida, Onodera), 6.9-340.

6.9-264

551.578.45(410)

Booth, R. E., *The snow of January and February 1955*. *Meteorological Magazine*, London, 4(1955):129-137, May 1955. 4 figs., 7 photos. DWB—A detailed description of the weather of Britain in Jan. and Feb. 1955 and depths of snowfalls. Depth of undrifted snow was 1-3 ft over a wide area, with very heavy drifting. Many villages and farms were isolated and "Operation Snowdrop," relief by helicopter, continued in Scotland from Jan. 18-23. Maps show numbers of days of snow falling and snow lying in Britain in Jan. and Feb. *Subject Headings:* 1. Snowstorms 2. Great Britain.—C.E.P.B.

6.9-265

551.578.45/6(494)

*Zingg, Theodor (*Meteorologist, Weissfluhjoch*), *Die Wetter- und Schneeeverhältnisse des Winters 1950/51 in den Schweizer Alpen*. [Weather and snow conditions in the 1950/51 winter in the Swiss Alps.] [1953?] 22 p. 19 figs. DWB—A thorough analysis of snow, precipitation and other climatic data for Switzerland and of synoptic conditions during the particular snowstorms which resulted in great accumulations of snow in 4 short periods (with resulting avalanches in places where none has occurred in the memory of man). Isohyetal maps for each month; histograms showing annual winter precipitation at Platta, Davos, St. Maria Andermatt, and Reckingen; mass curves for accumulation of new snow Nov. 1950-Feb. 1951 at Davos and Bedretto and synoptic charts for 20 Jan., 2 and 10 Feb., 1951 are presented along with tabular data. *Subject Headings:* 1. Severe snowstorms 2. Synoptic conditions for snowstorms 3. Avalanches 4. Switzerland.—M.R.

6.9-266

551.578.46:551.588.7

Roots, E. F. and Swithinbank, C. W. M., *Snowdrifts around buildings and stores*. *Polar Record*, 7(50):380-387, May 1955. 2 figs., 2 plates, 3 refs. DLC—The layout of Maudheim, base of the Norwegian-British-Swedish Antarctic expedition, and the resulting drifts, are described. Attempts to minimize drifts were only partially successful. Contours of snowdrifts formed by obstacles parallel and broadside to the prevailing wind are plotted and recommendations made. *Subject Headings:* 1. Snow drifts 2. Building effects 3. Maudheim, Antarctica.—C.E.P.B.

6.9-267

551.578.46

Shakhov, A. A., *Fizicheskie protsessy v snegovom pokrove*. [Physical processes in snow cover.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog. i Geofiz.*, 12(3):239-248, 1948. 3 figs., 3 tables, 34 refs. DLC—Influence of water vapor migration on the structure of snow cover is analyzed. The migration occurs in upward and downward directions and results in sublimation of vapor on snow crystals and in their freezing together. The process of moisture migration increases the hardness of snow cover. The same effect occurs under wind influence, which destroys the crystalline structure of snow flakes by mixing them together. The growth hardness of snow cover is caused also by diminishing air temperatures. *Subject Headings:* 1. Snow cover 2. Snow mechanics.—N.T.Z.

6.9-268

551.578.46

Zingg, Theodor, *Die Bestimmung der klimatischen Schneegrenze auf klimatologischer Grundlage*. [The determination of the climatic snow line on a climatological basis.] *Davos, Switzerland. Eidgenössisches Institut für Schnee- und Lawinenforschung, Mitteilungen*, No. 12, pt. 1954. DWB. Reprint from: *Angewandte Pflanzensoziologie*, 2:848-854, 1954. 2 figs.,

29 refs. **DWB**—Empirical relations are developed for the beginning and end of snow cover at different heights along a profile up to 2540 m at Davos. The extrapolated equation for the total duration of the snow cover leads to 365 days at 3230 m height (for the last 17 years which is defined as the climatic snow line. In 1911–1920 the snow line was at 2900 m. *Subject Headings*: 1. Snow line 2. Mountain climatology 3. Davos, Switzerland.—A.A.

6.9-269

551.578

Borger, Alberto, **Una granizada memorable en "La Estanzuela," la del 1.º de Enero de 1954.** [A memorable hailstorm at "La Estanzuela," Jan. 1, 1954.] *Revista Meteorologica* Montevideo, 13(46):26-33, June 1954. 2 figs., ref. **MH-BH**—Comparative description of two exceptionally intense hailstorms in Uruguay (Sept. 6, 1909 as related by J. ZOLESI, and Jan. 1, 1954). The barograms presented reveal a marked difference in the development of the two events. During the 1909 storm a sudden pressure drop occurred while the 1954 storm had a shallow pressure curve. *Subject Headings*: 1. Hailstorms 2. Uruguay.—G.T.

6.9-270

551.578

Feteris, P. J., **A hail survey during June and July 1955.** *Weather*, 10(6):209-210, June 1955. **DWB**—Plan for a study of thunderstorms by radar from London and Dunstable. Reports of hail within 100 miles of Dunstable are asked for. *Subject Headings*: 1. Hail survey 2. England.—C.E.P.B.

6.9-271

551.578.89:551.510.4

Capello, Carlo Felice, **Pioggie di fango e nevi rosse sull'Europa nel 1947.** [Muddy rain and red snow over Europe in 1947.] *L'Universo*, Florence, 29(2), March-April 1949. 23 p. 2 figs., photos, 8 tables, diagrs., 12 refs. Abstracted from reprint. **DWB**—Seven instances of colored precipitation in the southwestern part of Europe are analyzed as to (1) details of observation, (2) composition of particulate matter obtained from precipitation and (3) center of action and disturbances over northern Africa. All dust-falls are found to be connected with warm fronts preceding weakening cyclones and ascending over cold air masses in the north. *Subject Headings*: 1. Mud rains 2. Red snow 3. Dust falls 4. Europe.—G.T.

HYDROMETEOROLOGY

See also: **Hydrol. studies** (Lyshede), 6.9-10; **Coastal winter-flow index**, 6.9-123; **Evapo-transpiration** (Keller), 6.9-234; **Evapor. from soil** (Stanhill), 6.9-236; **Violent floods** (Japan. Met. Obs.), 6.9-263.

6.9-272

551.579(569.4)(058)

551.577(569.4)

*Israel. Water Dept. Hydrological Service, **Hydrological Year-Book of Israel, 1951/52** Jerusalem, 1954. 247 p. numerous charts. In English and Hebrew. **DWB**—Contains voluminous hydrologic data as in previous yearbooks. Data are mainly in graphical form. Historical data (i.e., for previous years) are omitted and will be published every 5 years. Rainfall data are in the form of monthly histograms for each station, which parallel graphs of chlorine content and yield and numerical data on analysis (pH content, solid and alkaline content). Not only rivers but "wadis," springs and wells are included, and all are listed with coordinates, etc. (for 1946/1947 Yearbook and 1949/50 issues, see 5.2-242, Feb. 1954, *MAB*). *Subject Headings*: 1. Hydrologic yearbooks 2. Annual hydrological reports 3. Precipitation data 4. Israel.—M.R.

6.9-273

519.24:551.579:628

Kovner, Jacob L. and Evans, Thomas C., **A method for determining the minimum duration of watershed experiments.** *American Geophysical Union, Transactions*, 35(4):608-612, Aug. 1954. fig., 3 tables, 3 refs., 3 eqs. **MH-BH**—The investigator is frequently presented with the practical problem of determining the number of observations required to show a significant difference between two means if the difference is greater than a fixed amount and some estimate of the variance is known. A hydrologic method has been presented which provides the following information: (1) length of the treatment period following a known

extended calibration period, (2) length of the calibration period in advance and (3) the smallest difference due to treatment which can be detected as significant at a chosen probability level, when the length of two periods has been assumed. This method may be applied in other problems where, in effect, we are comparing two or more regression lines. *Subject Headings:* 1. Regression equations 2. Water supply survey.—*Authors' abstract.*

6.9-274

551.579:551.588.6

Smirnov, V. V. and Odinkova, N. S., *Gidrologicheskaya rol' osinovykh lesov*. [Hydrological role of aspen forests.] *Akademiia Nauk SSSR, Doklady*, 99(5):849-852, Dec. 11, 1954. figs., 3 tables, 10 refs. **DLC**—An experimental study of the hydrologic role of aspen was carried out on plots with dark gray, heavy clayey forest soil. An analysis of the moisture balance showed that transpiration of aspen stands depended upon their growth. The greatest amount of moisture expended for transpiration is when the aspen trees are 25 years old and the least amount when they are 8 and 37 years old. *Subject Headings:* 1. Forest hydrology 2. Hydrologic cycle 3. Transpiration of forests.—*I.L.D.*

6.9-275

551.579:551.311.1

†Strauch, Karl Theodor, *Entstehung, Verhütung und Beseitigung von Eis in stehenden und fließenden Gewässern und insbesondere an Stauanlagen*. [Origin, prevention and removal of ice in standing and running waters and especially in dams.] *Deutsches Gewässerkundliches Jahrbuch, Besondere Mitteilungen*, Coblenz, No. 10, 1954. 158 p. 72 figs. (incl. photos.), 66 refs. **DWB**—This very comprehensive monograph deals with definitions and descriptions of the various types of ice; the formation of ice on standing water as surface ice through supercooling, crystallization, and heat loss to the atmosphere by conduction; the formation of ice in slowly flowing water as surface ice and in rapidly flowing water as ground ice, floating ice; the movement of ice during the various stages of the ice period; preventive measures against ice interference in the operation of power stations; and design of dams with special reference to ice conditions; numerous illustrations and diagrams and an extensive bibliography are included. *Subject Headings:* 1. Ice formation 2. Ice movements 3. Ice prevention 4. Ice bibliographies 5. Ice removal.—*I.L.D.*

6.9-276

551.579:628.1

Thomson, D. Halton, *A general survey of the water problem in Great Britain*. *Royal Meteorological Society, Quarterly Journal*, 81(348):266-268, April 1955. **DWB**—A general survey of the problems of water supply from the engineer's point of view—size of reservoirs, utilization of underground water supply, and droughts. *Subject Headings:* 1. Water supply 2. Great Britain.—*C.E.P.B.*

6.9-277

551.579.1:551.577.2

Reinhold, F., *Zur Ermittlung von Abflussmengen aus Niederschlagsbeobachtungen*. [The determination of the amount of discharge from precipitation observations.] *Wasserwirtschaft*, Stuttgart, 45(5):113-121, Feb. 1953. 14 figs., 42 eqs., 20 refs. **DLC**—The author presents a method for determining the discharge amount of a collection system, which traverses a drainage area of given form (length, width and height) and in which the slopes of the principle collectors and of the tributary streams are known, for a rainfall of specified duration and intensity. This procedure is based upon an analysis of relationships among duration, intensity and frequency of rainfall, of the discharge process over small areas including its duration and amount, and the discharge in the collection channel. Formulas for determining the discharge amount are developed. *Subject Headings:* 1. River discharges 2. Rainfall amount.—*I.L.D.*

6.9-278

551.579.4

§*Pardé, Maurice (*Grenoble University*), *Sur quelques grandes crues de l'été 1954*. [On the great floods of the summer of 1954.] *Revue pour l'Etude des Calamités*, Geneva, 14(32):37-76, Jan./Dec. 1954. tables, figs., foot-refs. **DWB**—A preliminary but quite adequate analysis of the main features of the floods in the Danube, the Rio Grande (Texas), the Yangtze Kiang (China) and mention of devastating floods in India, Korea and Iran during the summer

of 1954, and a comparison with previous record floods. Hydrological, synoptic meteorological statistical and geographical aspects are discussed and illustrated, with data included. The analysis of the central European floods is arranged by basins and simultaneous floods in western Alps also covered. All of these floods were sudden and disastrous. *Subject Headings:* 1. Floods 2. Record floods 3. Floods, Danube (1954) 4. Floods, Rio Grande (1954) 5. Danube Basin 6. Rio Grande Basin, Texas 7. Yangtze Kiang, China.—*M.R.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

6.9-279

551.58

†Sekiguti, Takeshi (*Centr. Met. Obs., Tokyo*), **Progress of climatology in Japan.** *American Meteorological Society, Bulletin*, 35(9):428-432, Nov. 1954. 65 refs. **MH-BH**—The author reviews the work in the field of climatology carried out in Japan since the introduction of scientific climatology into Japan during the 1880's, especially the research carried out during approximately the last 30 years. The survey includes physical climatology, local and city climates, microclimatology, climatic change, phenology, applied climatology, and climatic disasters. Each of these sections is accompanied by citations of the more important papers. *Subject Headings:* 1. Climatology 2. Climatological research 3. Japan.—*I.L.D.*

CLIMATE OF PARTICULAR PLACES

See also: **American weather** (Kimble), 6.9-5; **Bouvet Island** (S. Africa. Weather Bureau), 6.9-23; **Met. notes on Chile** (Gt. Brit.), 6.9-35.

6.9-280

551.582 (99)

Aubert de La Rüe, Edgar, **Les terres australes.** [Antarctic islands.] Paris, Presses universitaires de France, 1953. 126 p. 30 refs. *Que sais je?* No. 603. **DLC**—Detailed description of the geography, vegetation, animal life, climate and history of exploration of the Antarctic islands. Each island is discussed in a separate section. In the section on climate mean and extreme values of temperature are indicated and cloudiness, wind and other factors discussed. The climate of the Antarctic as a whole; of each group of islands in the three sectors—Indian, Atlantic and Pacific; and of each separate island (e.g., St. Paul, New Amsterdam, Crozet, Kerguelen, Marion, Heard, Campbell) is discussed in separate sections, in some detail. *Subject Headings:* 1. Climate of Antarctic islands 2. Antarctic Regions.—*G.T.*

6.9-281

551.582 (54):711.4

Fry, E. Maxwell and Drew, Jane B., **Chandigarh and planning development in India.** *Royal Society of Arts, Journal*, 103(4948):315-333, April 1, 1955. 7 figs. **GB-MO**—Chandigarh is the new capital of the Punjab. **FRY** briefly describes the ambitious general plan; **JANE DREW** goes into detail, including adaptations to climate (intensely hot summer, cold winter) and low cost. Particular attention is given to shade and ventilation. *Subject Headings:* 1. Town planning 2. Chandigarh, India.—*C.E.P.B.*

6.9-282

551.582.1 (47)

*†Obedientova, G. V., **Proiskhozhdenie Zhigulevskoi Vozvyshechnosti i razvitiye ee rel'efa.** [The origin of Zhiguli Plateau and the development of its relief.] *Akademiia Nauk SSSR, Institut Geografii, Trudy*, v. 53, Materialy po Geomorfologii i Paleogeografii SSSR, Moscow 1953. 246 p. 74 figs., bibliog. p. 235-246. Price: 15 rub. **DLC**—Information on the characteristics of the plateau's climate are given on p. 14-17. Temperature, temperature range, amount and distribution of precipitation, thickness of the snow cover (depending on the exposure of the slopes and the character of vegetation), humidity, direction and strength of winds, etc. are discussed. General features of the climate are: hot and dry summer; severe, snowy winter; large daily and yearly temperature variations, rapid shift from winter frost to summer heat. *Subject Headings:* 1. Climatic data 2. Plateau climates 3. Climate of Zhiguli Plateau 4. Zhiguli Plateau, U.S.S.R.—*A.M.P.*

6.9-283

551.582.2(567)

*Iraq. Meteorological Dept., *Climatological means for Iraq*. Its *Publication*, No. 10, 1954. mostly tables. ref. p.v. DWB—Extensive tables of monthly and annual means or frequencies of the ordinary meteorological elements (temperature, pressure, wind, relative humidity, cloudiness, rainfall and number of days with various weather phenomena) for the day or for fixed hours (03, 06 and 12 h GMT) are presented for the entire period of record at 20 stations in Iraq. Baghdad, Basrah, Diwaniya and Mosul have more than one station (record) included. History of records since 1888, station location table and chart, explanation of each table and references to 15 earlier works on climate of Iraq or Mesopotamia are included. (See items 2F-149 and 186, June 1951, *MAB* for earlier titles.) *Subject Headings*: 1. Climatic data 2. Climate of Iraq 3. Iraq.—*M.R.*

6.9-284

551.582.2(46) 551.589

§*Mateo Gonzalez, Pedro (*Met. Observatory of Spain*), *El clima de Gijón, Costa Cantabrica de España*. [Climate of Gijón, on the Cantabrian Coast of Spain.] *Spain. Servicio Meteorológico Nacional, [Publicaciones], Serie A, Memorias*, No. 25, 1955. 78 p. 20 figs. (1 fold.), 38 tables. DWB—An unusually detailed compilation of all the available records for Gijón, on the northwest coast of Spain. Records begin in Nov. 1922 and continue until Dec. 1950, with brief interruption (1936-8). Values presented for each month and for the year are pressure, dry and wet bulb temperatures (7h, 13h and 18h), relative humidity, vapor pressure, wind (8 directions), speed of wind, cloudiness (3 times a day), sunshine, precipitation and number of days with various phenomena. In addition, frequencies of winds of various speeds and from 16 directions, total wind movement and maximum movement in a day for each month, evaporation, precipitation in l/m², days with snow, snow cover, hail, thunderstorms, fog, dew and precipitation of various intensities for each month of each year are given. In addition, there is a thorough analysis of the climate of each season, the synoptic situations which bring certain types of weather during summer and winter (illustrated with synoptic charts), wind roses, climagrams and discussion of each element and the general elements of the region (Cantabria). Numerous graphs, histograms, etc. illustrate the text. A large fold. chart shows extreme day to day variations in extreme high and low temperatures of total period of record, and variability of mean day to day temperatures throughout the year. One might discover 365 singularities in the year if one searched. *Subject Headings*: 1. Climate of Gijón, Spain 2. Synoptic climatology 3. Gijón, Spain.—*M.R.*

CLIMATIC CHANGES

See also: Meandering valleys (Dury), 6.9-257; Climatic change (Büdel), 6.9-261.

6.9-285

551.583:551.461.2:551.311.2

Hurtig, Theodor, *Zur Frage der postdiluvialen Überflutung der südwestlichen Ostseeküste*. [On the post-diluvial inundation of the south-west Baltic coast.] *Petermanns Geographische Mitteilungen*, 99(2):90-99, 1955. 2 figs., 5 plates, table, 43 refs. DLC—This paper deals with the submergence of the *Litorina* period (about 5500 B.C.) but includes a comprehensive summary of Late Glacial and Postglacial climatic changes in North Germany and a comparison with glacier fluctuations in Norway and firn levels in Iceland. The *Litorina* transgression was largely due to melting of ice, and ceased with the subsequent readvance of glaciers. Later minor advances and retreats of ice were marked by minor coastal changes, especially formation and disappearance of dunes. *Subject Headings*: 1. Climatic changes 2. Glacier variations 3. Sea level changes.—*C.E.P.B.*

6.9-286

551.583.1:551.311.12

Tollner, H., *Über die Ursachen der Gletscherschwankungen in den letzten 200 Jahren*. [Causes of glacier fluctuations during the last 200 years.] *Wetter und Leben*, 5(3/4):82-83, May 1953. MH-BH—In order to estimate the interaction of air temperature and precipitation during the summer a "glacier maintenance tendency" was determined for the snow regions from the difference $N - T$ (N =precipitation and T =temperature in tenths degrees Centigrade). It is based upon the fact that high temperatures in the summer reduce snow surfaces and are

accompanied by diminished precipitation, and low temperatures preserve ice and snow masses. The relationship between variations in the meteorological variables and Alpine glaciers is discussed briefly. *Subject Headings:* 1. Glacier variations 2. Temperature effects 3. Precipitation effects 4. Alps.—*I.L.D.*

6.9-287

551.583.14(49)

*†Labrijn, Aart, *Het klimaat van Nederland gedurende de laatste twee en een halve eeuw* [Climate of the Netherlands during the last two and a half centuries.] Schiedam, Roelant, 1945. 114 p. numerous tables, diagrs., foot-refs., list of sources p. 17-21. Thesis (PhD)—Univ. of Utrecht, Dec. 1945. DLC. English translation as: *Netherlands. Meteorologische Instituut, Mededeelingen en Verhandelingen*, No. 49, 1945. (See G-198, July 1950, *MAB*) DWB—Extensive tables and analysis of data from long period records of temperature (1705-1944), precipitation (1735-1944), wind (1700-1944), pressure (1795-1944) and various records of sunshine, cloudiness, etc. for stations in Holland such as Delft, Leiden, Utrecht, Haarlem, Zwaneburg, den Haag, Breda and Maastricht, reduced to Utrecht—De Bilt in some cases. show secular variations in these elements which are ascribed to greater continentality or marine influence in certain periods. Winter temperature declined up to 1790, increased from 1820 to 1880, decreased somewhat to 1900, then increased to 1940. Precipitation showed similar variations though decline has been almost continuous since 1880. *Subject Headings:* 1. Climate of Netherlands 2. Climatic changes 3. Long period records 4. Netherlands.—*M.R.*

6.9-288

551.583.3:551.311(43)

Okolowicz, W., *Rekonstrukcja klimatu i jego zmian na podstawie morfologii terenu* [Reconstruction of climate and its variations based on geomorphology.] *Przegląd Geograficzny*, Warsaw, 21(1/2):83-91, 1947. diagrs. English summary p. 90-91. DLC—A summary of results of investigations, carried out by the author in the vicinity of Wilno and Trok in 1941 and 1943 concerning the connection between climatological factors and the geomorphological forms of the locality. The respective terrace formations are illustrated in detail. The high terraces with deep side erosion mark a period of heavy precipitation, indicating proximity to a polar front on the margin of the ice sheet which lay just to the north. The middle terraces indicate drier and warmer conditions, yet continuing anticyclonic winds and little side erosion. Later increasing westerlies with warmer oceanic climate, melting ice and considerable loess deposits are evident below the lowest of the middle terraces. *Subject Headings:* 1. Geomorphology 2. Quaternary climates 3. Wilno, Poland 4. Trok, Poland.—*A.M.P., M.R.*

6.9-289

551.583.3:551.7

†Rathjens, Carl, *Zur Frage der Gliederung der Würmeiszeit*. [On the correlation of the Würm glaciation.] *Petermanns Geographische Mitteilungen*, 99(2):81-87, 1955. 70 refs. DLC—MILANKOVITCH's radiation curve gave 3 dated Würm stadia which were widely but uncritically accepted. Author studies all the evidence for a 3-fold division. Even in the Alps it is only visible in a few places. Correlation of German and N. American moraines with Alpine stages is uncertain. Other bases of correlation considered are loess and eustatic changes of sea level (at max. of Würm put at -90m). No final conclusions can be reached about correlation. *Subject Headings:* 1. Quaternary period 2. Würm ice age.—*C.E.P.B.*

MICROCLIMATOLOGY

See also: Micromet. at Slope Farm (Uehara), 6.9-11.

6.9-290

551.584:00

Sutton, O. G., *Opening address* [at symposium on micrometeorology]. *I.U.G.C. Association of Meteorology, Brussels, 1951, Procès-Verbaux des Séances. Mémoires et discussions*, p. 235-236, pub. 1953. DWB—Micrometeorology is defined in the Anglo-American sense as the study of the fine structure of atmospheric processes, including mathematical and observational aspects of turbulence, the lower layer of the atmosphere, smoke scattering, valley effects, etc. *Subject Headings:* 1. Micrometeorology 2. Definitions.—*A.A.*

6.9-291

551.584.6

Kaneseiki, Shiro and Miyagawa, Ippei (*Faculty of Agric., Univ. of Naniwa*), **Micro-meteorology in the frame**, Pt. 1-2. *Journal of Agricultural Meteorology*, Tokyo, 9(3/4): 107-111, Aug. 1954. 7 figs., 4 tables, 13 refs. In Japanese; English summary p. 108, 111. **MH-BH**—Some micrometeorological properties were observed in large practical frames that were covered respectively with vinyl film, glass and oil paper. From Tables 1, 2 and Figs. 2, 3, it is recognized that the existence of two active surfaces (surfaces of the ground and cover of the frame) and the physical qualities of the covers have a significant effect on the micro-meteorology in the frames. In this report the writer treated mainly the following problems on the small model frames: (a) Change of cover transmissibility for heat radiation with solar elevations (Table 1). (b) Relation between the position of straw-mulching layer and the night temperature in the frame (Fig. 3). (c) Diurnal variation of the relative humidity and vapor pressure in each frame (Fig. 4). *Subject Heading: 1. Microclimatology of frames.*—*Authors' abstract.*

6.9-292

551.584.9:646

Perti, B. L. and Lal, B. B., **A reliable physiological index for evaluating summer clothing**. *Nature*, London, 175(4465):947, May 28, 1955. fig., 8 refs. **DWB**—The index is the average drop in skin temperature of the trunk 6 min. after exposure of the trunk fully covered with sweat to a streamlined flow of air 300 ft/min at 95°F., 60% R.H. Experiments with different types of shirt showed that muslin is the "coolest" fabric to wear in summer. *Subject Heading: 1. Clothing climate.*—*C.E.P.B.*

CLIMATIC CLASSIFICATION

See also: **Precip. effectiveness** (Crowe), 6.9-231; **Comfort climates** (Buettner), 6.9-301.

6.9-293

551.585:551.311(98)

†Büdel, Julius, **Die Klima-morphologischen Zonen der Polarländer**. [The climatic-morphological zones in the polar regions.] *Erdkunde*, Bonn, 2(1/3):22-53, 1948. 8 figs., bibliog. p. 52-53. **DLC**—A classification of polar regions according to the morphological effects of the climate. A map shows the principal zones: the glacier zone, the zone of moving soil—solifluction, (frost debris and tundra zone) which is followed by the boreal forest. Photos made by the author or the Norsk Polarinstitut show the characteristic forms. The theory of the morphological classification is discussed in detail, distinguishing between denudation on lines (PENCK) and areal denudation. (Same item as 5I-155, Sept. 1954, *MAB.*) *Subject Headings: 1. Climatic classification 2. Soil erosion 3. Morphology 4. Polar regions.*—*A.A.*

6.9-294

551.585(8)

Calabrese, Lindoro (*Inst. de Estudios Superiores, Montevideo*), **Apuntes relativos a la distribución de los climos de la America del Sur**. [Distribution of the climates of South America.] *Revista Orientación Meteorológica*, Montevideo, No. 3:23-28, Dec. 1948. **DWB**—A division of climates by "classes, types, varieties and features" is offered, their dependance on various factors is discussed in general terms and their geographical distribution in South America determined. This popular summary is based on works of JOSÉ MARÍA BERGEIRO, Director of the Sección Investigaciones Meteorológicas, Instituto de Estudios Superiores, Montevideo. *Subject Headings: 1. Climatic classification 2. Climate of South America 3. South America.*—*G.T.*

6.9-295

551.585:519.28

Gausson, Henri, **Détermination des climats par la méthode des courbes ombrothermiques**. [Definition of climates by the method of ombrothermal curves.] *Académie des Sciences, Paris, Comptes Rendus*, 240(6):642-643, Feb. 7, 1955. ref. **DWB**—The ombrometric method developed by the author in cooperation with F. BAGNOULS, essentially consists in drawing two curves, one of monthly mean temperature in °C and one of monthly mean precipitation in mm (each °C having a scale value corresponding to that of 2 mm of precip.). In this note three major climatic types and several sub-types are defined in terms of the absolute

and relative positions of the two curves. The method is believed to be useful in determining climatic analogs for the purpose of growing imported plants. *Subject Headings: 1. Climatic types 2. Climatic analogs.—G.T.*

6.9-296

551.585:634.7

Hare, F. Kenneth, **The boreal conifer zone.** *Geographical Studies*, London, 1(1):4-18, 1954. 2 figs., foot-refs. **MH-BH**—The term "boreal" is applied to the circumpolar forest region in Alaska, Canada and Eurasia, approximately Köppen's Dc and Dd, and potential evapotranspiration 31-52 cm. The limiting climates are discussed. It is divided into forest tundra, woodland sub-zone, close forest sub-zone and sub-alpine forests in mid-latitudes. A vegetation map of Eurasia and a climatic map of polar regions are included. *Subject Headings: 1. Climatic classifications 2. Boreal zone 3. Arctic.—C.E.P.B.*

6.9-297

551.585:551.588.1(759)

Hela, Ilmo, **Remarks on the climate of Southern Florida.** *Bulletin of Marine Science of the Gulf and Caribbean*, 2(2):438-447, 1952. 5 figs., refs. *Miami, University of, Coral Gables, Florida. Marine Laboratory, Contribution*, No. 80. Abstracted from reprint. **DWB**—The climate of Florida is described in terms of Köppen's classification and the degree of continentality along the lines suggested by CONRAD and a chart drawn using the author's formula $K = \frac{1.97A}{.92 + \sin(\phi - 53)} - 13.3$ where K is the index of continentality (0-100), A is annual range of temperature °C, and ϕ is the geographical latitude. The prevailing winds for each month are shown on climograms and are used to explain unexpected high continentality of Florida Keys. *Subject Headings: 1. Climate of Florida 2. Continentality 3. Köppen's classification 4. Florida.—M.R.*

6.9-298

551.585.55(66)

Hiernaux, C. R., **Sur un nouvel indice climatique d'humidité proposé pour l'Afrique occidentale.** [On a new climatic index of humidity for West Africa.] *Institut Français d'Afrique Noire, Dakar, Bulletin, Ser. A, Sciences Naturelles*, 18(1):1-6, Jan. 1955. fig (fold.), foot-refs. **DWB**—Taking account of the fact that the regularity of precipitation rather than the total amount is important for plant growth, the author proposes a new formula which he uses as a moisture index in preparing a chart for West Africa. The formula is compared with that of DE MARTONNE which the author claims is not applicable here. The humidity index $I_h = 100 \frac{P}{T(tx - tn)(N + n/2)}$, where $tx - tn$ is mean annual amplitude of temperature, N = no. of months of the dry season when rainfall is less than 50 mm., and n is the no. of months of the wet season when rainfall is < 50 mm. Index 1 = desert, 1 to 10 dry creeks occasionally flooded; 10 to 30 where weathering increases and > 30 regions where weathering of chemical constituents would be important. Values of > 500 and even > 1500 occur in tropical forests. *Subject Headings: 1. Aridity index 2. West Africa.—M.R.*

BIOCLIMATOLOGY

See also: **Body temp. measurem.** (Spangenberg), 6.9-107.

6.9-299

551.586:358.4:355.

Whittingham, D. G. V. and Baskerville, F. W., **Wet-cold trials in Scotland.** *Great Britain. Flying Personnel Research Committee, FPRC* 903, 1954. 22 p. 6 figs., table. **Mimeo.** **GB-MO**—The survival equipment—parachute, dinghy, canopy, sleeping bag, air mattress and poncho cape—to be carried in a naval aircraft was tried out in a snow environment in the Scottish hills in Feb. 1954. A number of recommendations were made. *Subject Heading: 1. Aircraft survival equipment.—C.E.P.B.*

6.9-300

551.586:551.577:6

*Iowa. State College of Agriculture and Mechanic Arts, **Weather conditions and farm machinery operation.** Contract Cwb-8155, (Final Report), 1954. unpagged in the main

ables, 24 refs. Includes: Shaw, R. H., Runkles, J. and Barger, G. L., **Survey of precipitation and soil moisture conditions in Iowa.** 15 p. tables. DWB—Results of tests conducted at Ames, Iowa, indicate that oats yield is reduced by one bushel per acre for each day seeding is delayed, and that corn yields are reduced 0.56 bushel for each day of delay after a certain specified date. The same applies to hay. Hay grade is also a function of the number of rains which occur after it has been cut. Costs of farm machinery, size of farm and other factors which enter into optimum balance of machinery, size of farm and productivity are integrated in a statistical study of seasonal weather conditions in Iowa as they relate to farm profits. A sufficient margin of profit must be allowed (above average) to provide for the fact that a farmer may not be able to "weather" a series of bad years in order to wait for the good years which combine to make up the average. Soil moisture data in relation to precipitation deficit for 2 locations in Iowa are presented and analyzed. *Subject Headings:* 1. Agricultural meteorology 2. Soil moisture data 3. Rainfall-fertility studies 4. Precipitation deficit data 5. Iowa.—M.R.

6.9-301

551.586:612 551.585

Buettner, K. (*Univ. of Washington*), **Thermal comfort as a criterion for the classification of climates.** *Meteorological Monographs*, 2(8):99-103, Oct. 1954. Table, 16 refs. MH-BH—Various definitions of climate are reviewed critically and their irrelevance to describing human comfort or livability is pointed out. A scale of thermal climates pertinent to nude men in the open, clothed men in the open, men in houses in cold climates and men in houses in hot and sultry climates is provided. The physiological effect of warm diurnal climates on man is surveyed briefly and the nature and usefulness of the effective temperature is reviewed. A table giving the effective temperatures for various cities in the U. S. and for various dry hot and wet hot localities and the corresponding Köppen classification is presented. *Subject Headings:* 1. Comfort climates 2. Effective temperatures 3. Climatic classification 4. Köppen's classification.—I.L.D.

6.9-302

551.586:612.014.43:636 551.521.3

Kelly, C. F.; Bond, T. E. and Heitman, Hubert, Jr. (*Calif. Univ., Davis*), **The role of thermal radiation in animal ecology.** *Ecology*, 35(4):562-569, Oct. 1954. 9 figs., refs. DLC—The rate of heat loss from cattle, with special reference to the role of radiation in the heat balance as compared with conduction, convection and evaporation, is investigated. The mode of heat loss in swine under controlled conditions with air temperature being equal to wall temperature is discussed and radiant heat load imposed upon a Hereford cow under natural conditions measured with a Gier radiometer and under shaded and unshaded conditions is analyzed. The relation between an animal and its radiational environment is examined with reference to the amount and quality of radiation reaching the animal, and the amount of radiation reflected and absorbed by the animal and the reflectance and absorption of radiation by swine is considered. *Subject Headings:* 1. Thermal balance of animals 2. Albedo of animals 3. Absorption of radiation 4. Animal climatology.—I.L.D.

6.9-303

551.586:612.014.43

Woodcock, Alan H.; Pratt, Richard L. and Breckenridge, John R., **A theoretical method for assessing heat exchange between man and a hot environment.** *U. S. Quartermaster Corps. Research and Development Branch, Environmental Protection Section, Report*, No. 183, Jan. 1952. 40 p. 11 figs., 2 tables, 14 refs. On cover-title: **Heat exchange in hot environment.** DWB—The author develops a theoretical method for calculating the heat exchange between the skin of a nude man and a hot environment. This method is based upon the physical laws of heat and moisture transfer applied to a wet bulb thermometer and to a heated "wet bulb." The principles of the heated "wet bulb" are applied to man and illustrated with a sample computation. The theoretical equations are applied to experimental data on men under heat stress in order to determine the role of the sweat regulatory mechanisms and the other variables in the derived heat equation upon the ventilation requirement. Also the design of clothing for hot-dry and hot-humid environments is discussed. *Subject Headings:* 1. Human thermal balance 2. Heat tolerance 3. Physiological climatology 4. Clothing requirements.—I.L.D.

6.9-304

551.586:612

Smirnova, E. T., **K voprosu o teplovom sostoianii detei doshkol'nogo vozrasta vo vremia progulki v zimnee i vesennnee vremia.** [State of warmth in children of pre-school age during winter and spring strolling.] *Gigiena i Sanitariia*, Moscow, No. 3:25-31, March 1955. 2 figs. **DLC**—Observations were carried out on 12 children and their skin reaction to different (winter and spring) air temperatures was recorded. The author shows that winter temperatures above -9°C have no adverse influence upon the skin of children, while at temperatures lower than -9°C definite feeling of chill appeared. During spring many cases of overheating were observed mostly because children were not dressed to suit changed weather conditions. Individual training and degree of activity must also be taken into account. *Subject Headings*: 1. Skin temperatures 2. Weather sensitivity of children 3. Clothing requirements.—S.A.

6.9-305

551.586:615

Shakhbazian, G. KH. and Shleifman, F. M., **Meteorologicheskiĭ komfort dlia liudei vyppolniaiushchikh fizicheskuiu rabotu srednei tiazhesti.** [Meteorological comfort for individuals performing moderately heavy work.] *Gigiena i Sanitariia*, Moscow, No. 10:22-26, Oct. 1954. 3 figs. **DLC**—The upper line of the zone of microclimatic comfort for individuals performing moderately heavy work ($2.5-3.5\text{ cal/min}$) is formed by air temperatures of $15-16^{\circ}\text{C}$. The upper line of comfort is increased to $24-25^{\circ}\text{C}$ by air movement of 1.5 m/sec and to $26-28^{\circ}\text{C}$ by air movement of 3 m/sec . Further increases in air movement do not extend the zone of comfort. *Subject Headings*: 1. Comfort climate 2. Heat tolerance.—I.L.D.

6.9-306

551.586:616:550.4

Schüpp, W., **Zur statistischen Prüfung des Meteorotropismus in einem Gebirgstal.** [Statistical testing of meteorotropism in a mountain valley.] *Wetter und Leben*, Vienna, 6(5/6):104-109, Aug. 1954. 4 figs., 3 tables, 6 refs. **MH-BH**—Using as an example a weather severity study carried out in Glarus 1933/34 the author states that all types of weather analysis show a correlation with weather sensitivity; the most unequivocal results are obtained with the aid of dynamic weather analysis as reflected in the recordings of the Schmidt variograph. The results of an analysis of meteorotropic cases associated with föhn, valley winds and cold fronts are presented. *Subject Headings*: 1. Mountain bioclimatology 2. Glarus, Switzerland.—I.L.D.

6.9-307

551.586:616.1:612.014.4

Koiranskii, B. B. and Zarzhevskaja, D. A., **O zashchitel'no-fiziologicheskikh reaktsiiak sosudistoĭ sistemy pri okhlazhdenii organizma.** [Protective physiological reactions of the vascular system during cooling of the organism.] *Gigiena i Sanitariia*, No. 9:32-36, 1955. 3 figs., table, refs. **MH-BH**—The vascular reactions occurring during local cooling were studied on two female subjects, 25-30 years old, whose lower extremities were immersed in water of 10°C and the right hand was placed in a plethysmograph in water of 30°C . The recorded pulse waves are analyzed and sample records are illustrated. It is shown that as a result of repeated exposure, gradual acclimatization to low temperatures was reached. The surface of the body acquires a richer blood supply which, together with the increased lability of the vascular system and the reflex hyperemia raises the resistance of the organism to chilling. *Subject Headings*: 1. Vascular reactions to cooling 2. Acclimatization 3. Cooling effect.—I.L.D.

6.9-308

551.586:63

Hecht, W., **Kleinklimatische Beobachtungen zur Erforschung der Entwicklungsbedingungen von Claviceps purpurea.** [Microclimatic observations for investigating the developmental conditions of *Claviceps purpurea*.] *Wetter und Leben*, Vienna, 6(5/6):132-133, Aug. 1954. 2 figs., table, 4 refs. **MH-BH**—The development of ergot is primarily dependent upon temperature and humidity while alkaloid formation is greatly influenced by radiation. The results of experiments carried out in Steiermark are cited. *Subject Headings*: 1. Climatic influences 2. Plant diseases.—I.L.D.

6.9-309

551.586:632.9:633.491

†Burgos, Juan Jacinto (*Dept. of Agromet. in Argentine Natl. Met. Serv.*), **Influencias microclimáticas y climáticas sobre la población de insectos transmisores de virus en la papa, en la región S.E. de la Provincia de Buenos Aires.** [Microclimatic and climatic influences on the population of insect vectors of potato virus in the southeastern part of the Province of Buenos Aires.] *Meteoros*, Buenos Aires, 4(4):261-286, Oct./Dec. 1954. 3 figs., 12 tables, 31 refs. English summary p. 261. **DWB**—This is a study of the extent to which the population of insects transmitting potato viruses depends upon the climate and microclimate of the plants in the southeastern portion of the province of Buenos Aires. Some of the literature dealing with the transmission of viruses to potatoes by insects and the influence of weather conditions upon the insects is reviewed. In analyzing the results, the author examines the role of the position of the leaf and of its orientation in the distribution of the insect populations, variation of insect population in different years with special reference to meteorological characteristics and methods for characterizing the meteorological influences such as the cooling power of wind and the daily thermoperiodism. *Subject Headings:* 1. Plant microclimatology 2. Insect climatology 3. Plant diseases 4. Potatoes 5. Buenos Aires, Argentina.—*I.L.D.*

6.9-310

551.586:635

de Fina, Armando L. and Garbosky, Antonio J., **Diffusión geográfica de frutales en el Chaco Argentino.** [Geographic distribution of orchards in the Argentine Chaco.] *Sociedad Científica Argentina, Anales*, 157(1/3):18, Jan./March 1954. **DLC**—Only 3 out of 12 fruits such as the cacao, lemon, banana, olive, fig, pear, grape, apple, etc.) introduced into 42 regions of the Argentine Chaco thrived. These were the banana, the lemon and the fig. Studies to determine the limiting factors in their distribution revealed the following causes: some were limited by winter frost (for example, cacao), by lack of definite winter (for apples), hot summers for walnuts) and hot, damp summers for fruits requiring hot dry weather (such as dates). *Subject Headings:* 1. Climatic factors in fruit growing 2. Horticulture 3. Gran Chaco, Argentina.—*M.R.*

6.9-311

551.586:636

†Findlay, J. D. (*Hannah Dairy Res. Inst., Kirkhill, Ayr, Scotland*), **The climatic physiology of farm animals.** *Meteorological Monographs*, Boston, 2(8):19-29, Oct. 1954. 4 figs., table, 7 refs. **MH-BH**—A review is presented of the available literature on the effect of climate, in particular temperature, upon the physiological reactions and behavior of cattle. The discussion covers: effect of temperature on grazing habits, on body temperature, on cardio-respiratory functions, on milk production, milk fat percentage and food consumption, on blood composition, on milk composition, on water consumption, on skin and hair temperature, and on considerable weight loss and moisture vaporization from the respiratory tract and the exterior body surface of cattle. *Subject Headings:* 1. Animal climatology 2. Temperature effects on animals.—*I.L.D.*

ENVIRONMENTAL INFLUENCES

See: Annual temps. (Hovmöller), 6.9-185; Diffusion of fog water (Kuriowa), 6.9-246; Snowdrifts (Roots, Swithbank), 6.9-266; Forest hydrology (Smirnova, Odinokova), 6.9-274; Climate of S. Fla. (Hela), 6.9-297.

UPPER AIR AND SYNOPTIC CLIMATOLOGY

See also: Climate of Gijon (Mateo Gonzales), 6.9-284.

6.9-312

551.589 551.509.2/3

§*Massachusetts Institute of Technology. Div. of Industrial Cooperation, **Some statistical and mathematical approaches to meteorology.** Contract AF 19(122)-446, Final Report [1955?] each section repaged. numerous tables, charts (many fold.), eqs. **MH-BH**—A voluminous and elaborate report on 5 different synoptic-statistical climatology projects aimed at improving or providing a good statistical basis for improving short or even long range fore-

casts. Air mass changes, surface pressure autocorrelations, planetary circulation, statistical-synoptic charts (probability maps), and 12-hr pressure change anomalies are each in turn investigated by getting from the data for 40 years for the main U. S. weather stations, etc., all the information that can be obtained by using modern methods, computers, tables and charts. Especially interesting are carefully drawn charts of maximum and minimum (5% limits) temperature, pressure, precipitation, etc., for U. S. *Subject Headings: 1. Synoptic climatology 2. Statistics in climatology 3. Autocorrelation charts 4. Weather forecasting.* I. Wadsworth, G. P.—*M.R.*

6.9-313

551.589.5:656.71 (417)

§*Daly, C. H. and Rohan, P. K., *Analysis of occasions of poor visibility and low ceiling at Shannon Airport.* *Eire. Meteorological Service, Technical Note*, No. 18, Jan. 1955. 20 p. 13 figs., 3 tables. Price: 1s 6d. **DWB**—Hourly and half-hourly reports for Shannon Airport for July 1947-June 1953 were analyzed to determine frequency of landing conditions worse than ceiling 500 ft and/or visibility 1 mi. Histograms show diurnal variation in such conditions for each month, and also diurnal variation in such conditions when due to radiation effects. It is shown that radiation fog is the most frequent cause of poor landing conditions. Terrain is shown on chart and discussed. Time of formation and dissipation of radiation fog at Shannon in the various months (when other factors do not affect it) is clearly indicated. Greatest frequency is in early morning hours. Relation of fog to winds, both surface and geostrophic, to fronts, air-masses, sea fog, snow, precipitation, etc. and duration of fog is discussed. A number of typical situations are illustrated by synoptic charts. *Subject Headings: 1. Ceiling and visibility data 2. Radiation fog occurrence 3. Shannon, Ireland.*—*M.R.*

6.9-314

551.589.1 (64)

*Debrach, Jean (*Inst. Scientifique Chérifien, Casablanca*), *Notes sur les climats du Maroc Occidental.* [Notes on the climates of western Morocco.] *Rabat, Morocco. Institut Scientifique Chérifien. Service de Physique du Globe et de Météorologie, Recueil des Publications*, No. 5, 1953. 15 p. 5 figs., 6 tables, 15 refs. Reprint from *Maroc-Médical*, No. 342:32-53, 1953. **DWB**—The intensity of solar radiation and its relationship with air mass types, the mean monthly duration of insolation at various locations, the annual variation of precipitation seasonal distribution of thunderstorms, snow incidence, characteristics of wind direction and velocity, hydrometeors, and seasonal-thermal gradient, are discussed qualitatively. A regional climatic classification of western Morocco based upon the mean annual variation of temperature amplitude and precipitation is attempted. *Subject Headings: 1. Synoptic climatology 2. Climatic classifications 3. Western Morocco.*—*I.L.D.*

6.9-315

551.589.1:595.7

†Wellington, W. G., *Atmospheric circulation processes and insect ecology.* *Canadian Entomologist*, London, Ont., 86(7):312-333, July 1954. table, 9 figs., 41 refs. **DLC**—Brief descriptions of the more important air masses affecting the weather and climate of North America and of their source regions and of frontal systems are presented. The discussion includes the relationship between fronts and insect activity such as the mass flight of the spruce budworm, the effects of weather on daily variations of insect population, air mass climatology and insect mortality, the change in the number and direction of pressure centers in North America and its relation to outbreaks of the spruce budworm. *Subject Headings: 1. Air mass climatology 2. Insect climatology 3. Air mass effects 4. North America.*—*I.L.D.*

6.9-316

551.589.5:551.509.33

Müller-Annen, Hans, *Statistische Untersuchungen zur Frage der Realität der Singularitäten.* [Statistical investigations on the reality of singularities.] *Zeitschrift für Meteorologie*, 9(4):97-110, April 1955. 5 tables, 14 refs. **DWB**—The LEXIS dispersion theory is explained and applied to meteorological series. In a period (e.g., 30 years) in which there is no climatic change those connected with the general circulation have a greater dispersion than normal. Examples are heavy rain, thunder and hail. In series which do not vary greatly

from year to year it is shown that this is not due to the persistence tendency, as the persistence in the same date from year to year exceeds that from day to day in the same year. Such singularities are real and can even be used for long-range forecasting, e.g., in the dry summer of 1911 in N.W. Germany rain fell on the expected days. *Subject Headings: 9. Singularities in Statistical studies.—C.E.P.B.*

MISCELLANEOUS

SOLAR INFLUENCES

See also: Light attenuation (Giovannelli), 6.9-177; *Solar influences* (Rangarajan), 6.9-198.

6.9-317

551.590.21:551.594.51

Roberts, Walter Orr, *Corpuscles from the sun*. *Scientific American*, 192(2):40-45, Feb. 1955. figs., photos. **DLC**—The author traces the history of our knowledge of sunspots and streams of solar particles which cause auroras and magnetic disturbances when they reach the earth's atmosphere. His own theories are formulated and depicted in a schematic model diagram. The first hint of the effect of solar flares was noted by RICHARD C. CARRINGTON, in England on Sept. 1, 1859. The Chapman-Ferraro and Alfvén theories are contrasted. *Subject Headings: 1. Corpuscular theory 2. Auroral theories.—M.R.*

6.9-318

551.590.24:551.52

*Dirmhirn, Inge (Vienna), *Strahlung und Temperatur in Österreich während der partiellen Sonnenfinsternis am 30. Juni 1954*. [Radiation and temperature during the partial solar eclipse of June 30, 1954.] *Wetter und Leben*, Vienna, 6(7/9):163-165, 1954. 3 tables. **MH-BH**—Data are given on the intensity of global and sky radiation during the partial solar eclipse on June 30, 1954 in percent of mean value of undisturbed radiation, relative humidity at different altitudes—as recorded by radiosonde on June 30, 1954 at 1500 hours at Vienna, and a few examples of the variation of soil and air temperatures during the partial solar eclipse. *Subject Headings: 1. Solar eclipse, June 1954 2. Solar eclipse effects 3. Solar radiation intensity 4. Temperature variations 5. Vienna, Austria.—I.L.D.*

VISIBILITY

See also: Visibility study (Gavrilov), 6.9-75.

6.9-319

551.591:629.135

Olivier, J., *Étude des aides à l'atterrissage par mauvaise visibilité; le calcul des lignes d'approche*. [A study on landing aids for poor visibility; the calculation of lines of approach.] *la Météorologie*, Paris, Sér. 4, No. 33:19-74, Jan./March 1954. 15 figs., 15 refs., numerous eqs. French, English and Italian summaries p. 19. **MH-BH**—The author analyzes the applicability and validity of ALLARD's formula for night visibility and KOSCHMIEDER's for day visibility. The discussion includes: 1) conditions of perception including visibility in good weather, and effects of fog; 2) conditions of perception for pilots with regard to landing maneuvers and conditions of visibility; 3) computation of approaching beacons by means of geometric and photometric methods; and 4) the necessary meteorological observations such as exactness of visibility observations, horizontal visibility and oblique visibility. The discussion is mathematical and analytic. *Subject Headings: 1. Visibility 2. Night visibility 3. Aircraft landing aids 4. Beacons 5. Visibility in fog.—I.L.D.*

6.9-320

551.591:535.3

Whiten, A. J., *Selective absorption and fog forecasting*. *Weather*, 10(6):209, June 1955. **WB**—Haze is indicated by change in color of street lamps along a $\frac{1}{4}$ mile or more of straight road, from white or blue nearby to yellow in the distance. It is not shown by sodium lamps which are monochromatic. *Subject Heading: 1. Atmospheric attenuation.—C.E.P.B.*

OPTICAL PHENOMENA

See also: **Flying saucers** (Raimond), 6.9-95; **Sounding balloons** (Berthier, Mévolhon), 6.9-96; **Interplanetary matter** (Sen Gupta), 6.9-135; **Light attenuation** (Giovannelli), 6.9-177.

6.9-321

551.593:551.555.8

Baratoux, M., **Phénomène optique observé en avion**. [Optical phenomenon observed from an airplane.] *La Météorologie*, 4th Ser., No. 34:171-172, April/June 1954. 2 figs. **MH-BH**—During a flight from Bagdad to Beirut a dust storm arose and the sun projected the shadow of the airplane inscribed within a whitish colorless circle, surrounded by two rainbows, the diameter of both being equal to twice that of the circle. A photograph and a diagram of the phenomenon are presented. *Subject Headings*: 1. **Optical phenomena** 2. **Dust storms**.—*I.L.D.*

6.9-322

535.33 551.593

Kay, Irvin and Moses, Harry E., **The determination of the scattering potential from the spectral measure function**. New York Univ. Institute of Mathematical Sciences Div. of Electromagnetic Research, Contract AF 19(122)-463, Research Report, No. CX-18 Jan. 1955. 61 p. 8 refs. **DWB**—By generalizing the method of GELFAND and LEVITAN it is shown that in many cases the potential can be obtained uniquely from the spectral measure function, if we specify the asymptotic behavior in some representation of the eigenstates of the total Hamiltonian H associated with the measure function. In contrast to earlier treatments where one restricts oneself to an unperturbed Hamiltonian H_0 and a representation such that the H_0 is a second derivative operator and the potential is diagonal, the procedure described is quite general: H_0 may have almost any character, and the potential need not be diagonal in the representation in which the asymptotic description of the eigen-functions is specified. *Subject Headings*: 1. **Spectroscopy** 2. **Scattering potential**.—*Authors' abstract*.

6.9-323

551.593.53:551.521.3

de Bary, E. (*Met. Geoph. Inst., Mainz Univ.*); Bullrich, K. and Möller, F. (*Univ. of Mainz*), **Beiträge zur Erklärung von Himmelsfarbe und -helligkeit**. [Contribution to the explanation of color and brightness of the sky.] *Zeitschrift für Meteorologie*, Berlin, 8(10):303-309, Oct. 1954. 5 tables, 7 refs., 5 eqs. **DWB**—Color saturation and illumination density of the sky were calculated for ten special cases: 1) The influence of the earth's albedo upon the sky color is unintegrated—with increasing albedo illumination above the horizon increases 2) The color saturation and illumination density of the zenith were calculated at sunrise and sunset for three different turbidities. The atmospheric ozone was considered so that the effect of the ozone upon blue color of the sky in the case of low solar elevations could be shown 3) The case of a haze layer instead of that of an atmosphere uniformly filled with haze was considered. It was found that the point of the sky below the solar horizon has color tones of longer wave length and lower illumination density and above the solar horizon colors of shorter wave length and greater illumination density. *Subject Headings*: 1. **Skylight color** 2. **Sky brightness** 3. **Illumination intensity**.—*I.L.D. (trans. of author's abstract)*.

ELECTRICAL PHENOMENA

See also: **Conference on Auroral Physics**, 6.9-3; **Radioactive pollution** (Cockcroft), 6.9-74; **Night cloud** (McQuistan), 6.9-247; **Corpuscles from sun** (Roberts), 6.9-317.

6.9-324

551.59

Elettricità atmosferica prevenzione degli infortuni. [Atmospheric electricity and the prevention of accidents.] *Geofisica e Meteorologia*, Genoa, 2(3/4):75, May/Aug. 1954. **MH-BH**—The author suggests that variations in the atmospheric electricity field be measured carefully during the management of explosives so as to avoid accidents. *Subject Headings*: 1. **Atmospheric electricity** 2. **Explosions**.—*I.L.D.*

6.9-325

551.594

Reiter, Reinhold, **Ergebnisse synchroner Registrierungen luftelektrischer Elemente in sechs Niveaus zwischen 700 und 3000 m Seehöhe.** [Results of synchronous registrations of atmospheric electrical elements at six levels between 700 and 3000 m.] *Zeitschrift für Meteorologie*, 9(4):116-120, April 1955. 3 figs., 11 refs. DWB—Between Garmisch-Partenkirchen (705 m) and Zugspitze summit (2963 m) the atmospheric electric field was recorded at 6 and the vertical current at 2 stations. Specimen records in fog, drizzle, showers and snow or rain are shown and discussed. The investigation showed especially the charge distribution in different clouds and fog. In the transition from snow to rain the initially positive field changes to negative, but there is no corresponding change in the transition from graupel to rain. *Subject Headings:* 1. Atmospheric electricity measurements 2. Electric charge near the ground.—C.E.P.B.

6.9-326

551.594

*Yriberry, Arturo J. and Uhart, E., **Electricidad atmosférica en San Miguel. Análisis de los registros efectuados durante los años 1946 a 1951.** [Atmospheric electricity in San Miguel. Analysis of the records of 1946-1951.] *San Miguel, Argentina. Observatorio de Física Cosmica, Cuaderno*, No. 3, 1954. 4 p. 19 figs., 3 tables. Spanish and English summaries p. 3. DWB—This paper comprises a study of monthly and yearly averages and a graphic analysis of atmospheric electric elements measured at San Miguel during the years 1946-1951. A special study is made of five years' air conductivity values taken simultaneously from the coefficient of dissipation (GOCKEL-SCHERING) and GERDIEN's method. Although differences cannot be fully accounted for, it seems that the relative humidity of the air affects the dissipation method, making its readings too high with high humidity values. *Subject Headings:* 1. Atmospheric electricity 2. San Miguel, Argentina.—Authors' abstract.

6.9-327

551.594.12/3

Hess, Victor F. and Parkinson, W. Dudley, **On the contribution of alpha rays from the ground to the total ionization of the lower atmosphere.** *American Geophysical Union, Transactions*, Pt. 1, 35(6):869-871, Dec. 1954. 2 tables, 5 refs., 2 eqs. MH-BH—Alpha-ray ionization is perhaps the most variable single component of the ionization of the lower atmosphere. Many measurements have been made to determine the ionization from air-borne sources of alpha rays. This depends principally on the amount of radon and thoron in the atmosphere. An attempt is made here to evaluate the role of alpha rays originating from the surface of the ground and other naturally occurring surfaces. It was found that about ten per cent of the small ions observed at one meter above ground are originally produced at the ground and carried upward by convection. *Subject Headings:* 1. Alpha ray ionization 2. Atmospheric ions 3. Ion production.—Author's abstract.

6.9-328

551.594.13:551.509

Said-Ali, [Prof. at Univ. of Ankara], **Über die Möglichkeit der Wettervorhersage auf Grund der Leitfähigkeitsmessung der Luft.** [Possibility of weather forecasting based upon air conductivity measurement.] *International Union of Geodesy and Geophysics. Association of Meteorology, Brussels, 1951, Procès-Verbaux des Séances, Mémoires et discussion*, p. 158-163, pub. 1953. DWB—Unreliable and unreplicable results of air conductivity measurements are explained by polarization phenomena on the isolating parts of the electrometer. A special arrangement greatly improved the situation. The author claims that sudden decreases of the conductivity with more than 8×10^{-6} electrostatic unit per second are a reliable indicator of weather changes within the next four days. *Subject Headings:* 1. Atmospheric conductivity 2. Atmospheric electricity 3. Weather forecasting.—A.A.

6.9-329

551.594.21

Norinder, Harald and Pucher, Walter, **Field intensities and charge densities in thunderclouds.** *Arkiv för Geofysik*, Stockholm, 2(5):97-107, 1954. 7 figs., 4 tables, 10 refs., 5 eqs. DL—The fields at the underside of a cloud and at the earth's surface below are computed on

the assumption that the cloud is ellipsoidal in shape. By comparing with field intensities experimentally determined at the earth's surface, values for the cloud charge and charge density are obtained. The values found were from about 1 to 2.10^{-6} e.s.u./cm.³. The corresponding maximum field intensities are from 1 to 5 kV/cm. In this connection, the question of the conditions under which a lightning discharge may be initiated is examined. *Subject Headings: 1. Thundercloud electrification 2. Charge generation in thunderclouds 3. Lightning discharges.—Authors' abstract.*

6.9-330

551.594.221:623.18

Barrows, J. S. (*Intermountain Forest & Range Exper. St., Missoula, Mont.*), **Lightning fire research in the Rocky Mountains.** *Journal of Forestry*, Wash., D. C., 52(11):845-847, Nov. 1954. 3 refs. DWB—General account of research conducted under "Project Skyfire," a cooperative project of the Munitalp Foundation and several public agencies with the help of VINCENT SCHAEFER. The purpose of the Project is to determine the laws governing the development of lightning and fire weather; its chief activities at present are cloud survey, jet stream study and time-lapse photography. The importance of the project is stressed in terms of general figures on damage caused by lightning fires during the period 1948-1952. *Subject Headings: 1. Fire weather 2. Lightning fires 3. Forest fires 4. Rocky Mountains 5. Munitalp Foundation I. Schaefer, Vincent.—G.T.*

AURORAS

6.9-331

551.594.5:550.38

Chapman, S. (*Queens College, Oxford*), **A theory of the aurora polaris.** *U. S. Air Force Cambridge Research Center, Geophysical Research Papers*, No. 30:367-389, July 1954. 4 figures, 44 refs., 17 eqs. Discussion p. 386-387. MH-BH—The main observed facts concerning the aurora and the closely associated phenomenon of magnetic disturbance or storms are outlined. For several reasons, it is thought that a considerable portion of the theory of magnetic disturbances must be common ground. Discussion proceeds on the basis that the cause of the aurora is the emission from the sun of a neutral but ionized gas, probably consisting mainly of hydrogen. Such an emission appears to occur sometimes in a strong burst which lasts for approximately an hour. The burst is associated with an intense solar flare, followed by a great magnetic storm with an exceptionally active and widespread aurora. The emission may continue (possibly with interruptions) for weeks, producing a series of moderate magnetic storms and aurorae, which, unlike the great storms, manifest the 27-day recurrence tendency. Minor magnetic activity, and the aurorae observable from places near the auroral zone on almost every clear night, are likely to be caused by emissions of solar gas of relatively low density and/or speed. *Subject Headings: 1. Auroral theories 2. Magnetic storms 3. Auroral emissions.—From author's abstract.*

6.9-332

551.594.5:621.39

Forsyth, P. A. (*Univ. of Saskatchewan*), **Radio wave reflections from aurorae.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:117-135, July 1954. 11 figs., 17 refs. MH-BH—Radio wave reflections from aurorae were reported by a number of workers including HARANG and STOFFREGEN, PIERCE, LOWELL, CLEGG and ELLIOTT, and ASPINALL and HAWKINS. Such reflections have been interpreted by HERLOFSEN as being due to partial reflection of the radio waves at the boundaries of the auroral structure. According to this interpretation, the electron density within an auroral structure could be as low as 4×10^4 /cm³. Radio observations of aurorae have been made at Saskatoon, Saskatchewan, for the past two years, utilizing radar equipment operating at 106.5 Mc/s. Due to the nature of the apparatus used, the reflections were restricted to auroral forms located from 60 to 1100 km distant and elevated less than 7.5° above the horizon from the observing site. The auroral forms most frequently observed by the radar method were the rayed arcs and rayed bands. The auroral origin of the radio wave echoes was confirmed by comparing the radar records with photographs of the same region of the sky, both types of observations being made simultaneously. *Subject Heading: 1. Auroral reflections.—From author's abstract.*

6.9-333

551.594.5:551.501.8

Gerson, N. C., **Radio observations of the aurora.** *Journal of Atmospheric and Terrestrial Physics*, 6(5):262-267, May 1955. fig., table, 6 refs. DWB—Radio wave probings mostly on 50 Mc/s over North America showing auroral interaction in 1949-51 are listed. Monthly variation shows maximum frequency in April and Sept.-Oct. *Subject Headings:* 1. Radio echoes from auroras 2. North America.—C.E.P.B.

6.9-334

551.594.51:535.33:551.521.63

Petrie, W. and Small, R. (*Univ. of Saskatchewan*), **The intensities of ultraviolet features of the auroral spectrum.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:61-73, July 1954. fig., 5 tables, 15 refs., 4 eqs. Discussion p. 69-72. MH-H—Twenty-eight ultraviolet spectra of the aurora have been secured at Saskatoon, using a single-prism quartz spectrograph. Fifteen of these plates have been analyzed with a microphotometer and intensitometer and integrated relative intensities have been obtained of the main spectral features. The intensities have been corrected for the effects of Rayleigh scattering and ozone absorption. The corrected intensities are carefully discussed and it is shown that they yield vibrational temperatures less than 500°K. This temperature value is different from earlier results, and additional measurements are desirable. (For shorter version see item 6.9-289, Feb. 1953, MAB.) *Subject Headings:* 1. Auroral spectra 2. Ultraviolet intensities 3. Ozone absorption 4. Saskatoon, Saskatchewan.—Authors' abstract.

6.9-335

551.594.51

†Störmer, C. (*Inst. for Theor. Astrophysics, Oslo*), **Sunlit aurorae.** *U. S. Air Force Cambridge Research Center. Geophysical Research Papers*, No. 30:95-115, July 1954. 13 figs., 5 tables, 40 refs. MH-BH—Sunlit auroral rays have been observed in southern Norway on many occasions. They occur for some hours after sunset and before sunrise. Both the heights and lengths of sunlit rays are significantly greater than for normal auroral rays in the earth's shadow. The bases of sunlit rays are generally from 200 to 300 km and their summits are often higher than 800 km. The highest altitude yet measured is about 1100 km. The bases have a tendency to follow the boundary between dark and sunlit atmospheres. On rare occasions divided auroral rays, with the upper segment in the sunlight and the lower segment in the earth's shadow, have been observed. In northern Norway, HARANG has measured the elevation of auroral arcs in sunlight. This effect amounts to 10 to 40 km. The spectrum of sunlit aurorae, compared to that of normal aurorae in the earth's shadow, shows an enhancement of the atomic oxygen lines at 6300 Å, and of the first negative bands of ionized molecular nitrogen, particularly the bands at 3914, 4278, and 4708. The enhancement of the atomic oxygen lines is a direct effect of sunlight; this effect is also observed in the twilight spectrum of the airglow. *Subject Headings:* 1. Sunlit auroras 2. Sunlit auroral spectra 3. Sunlit auroral heights 4. Southern Norway.—Author's abstract.

6.9-336

551.594.51:551.521.7

Chamberlain, Joseph W. (*Yerkes Observ.*), **On the production of auroral arcs by incident protons.** *Astrophysical Journal*, 120(3):566-571, Nov. 1954. 3 figs., 6 refs., 10 eqs. DLC—The theory of the production of auroral arcs is extended to take account of a dispersion in directions for the incident protons. Earlier calculations of the $H\alpha$ profile (by the author) and of the luminosity distributions (by BATES and GRIFFING), for the case of protons entering from only one direction, were considerably different from the observed curves. In this paper the angular distribution of incident protons is obtained by comparing the computed profile and luminosity-curves with the observational data. Essentially the same angular distribution gives a satisfactory representation of both the profile and the luminosity, which suggests that the angular dispersion may indeed be an important effect. *Subject Headings:* 1. Auroral arcs 2. Auroral intensities 3. Solar protons.—Author's abstract.

6.9-337

551.594.52:77

*Frankpitt, B. L. and McQuistan, G. W., **Locations of the aurora australis from single station photographs.** Wellington, New Zealand. Carter Observatory, Contract AF 64(500)-1,

Scientific Report, No. 3, Sept. 10, 1954. 13 p. tables. **MH-BH**—This report is concerned with the method and results of analyzing single station photographic plates of aurorae. The eleven plates considered were exposed from the auroral photographic stations, Invercargill and Taieri, between 1950 Aug. and 1951 Sept. The auroral forms considered are homogeneous arcs, rayed arcs and draperies. Assuming a constant height for the base of these forms, geographical coordinates for the sub-auroral points have been calculated. A discussion of the errors involved in these results, reveals that an error in the assumed height (H) of 10 km will give an error of less than $0^\circ.5$ in (Z), the angular distance of the sub-auroral point from the station. The error in (Z) due to altitude measurement, is less than $0^\circ.1$. A brief description of each plate precedes the results obtained from it, but as yet, no deductions have been made. *Subject Headings:* 1. Aurora australis 2. Auroral photography 3. Auroral forms 4. New Zealand.—*From authors' abstract.*

6.9-338

551.594

*McQuistan, G. W.; Frankpitt, B. L. and Thomsen, I. L., **Heights and locations of the aurora australis.** Wellington, N. Z. Carter Observatory, Contract AF 64(500)-1, Scientific Report, No. 2, July 1, 1954. 8 p. tables, 4 refs., eqs. **MH-BH**—Although data for only 3 auroral displays (in 1951) are calculated and analyzed, the comparison of height determinations obtained from dual measurements and presented here is unique. The photographic measurements were made at two stations: Taieri ($45^\circ 51'S$, $170^\circ E$) and Invercargill ($46^\circ 25'S$, $168^\circ E$) in New Zealand, with cameras loaned by CARL STÖRMER, operated by meteorological personnel at airports in these places. Photographic work was synchronized by telephone. It was found that accuracy of 2% at 250 km height, and 1.5% at 95 km height was possible, so figures on auroral heights are seldom accurate to more than ± 1 km, and usually to ± 5 km. No aurora intense enough to photograph have occurred in area since 1951. *Subject Headings:* 1. Auroral heights 2. Auroral photography 3. New Zealand.—*M.R.*

ACOUSTICAL PHENOMENA

6.9-339

551.596:53

Smith, P. W., Jr. (Harvard Univ., Cambridge, Mass.), **Precision measurement of the velocity of sound in air.** *Acoustical Society of America, Journal*, 25(1):81-86, Jan. 1954. 3 figs., 2 tables, foot-refs. **DLC**—A method for the precise measurement of the velocity of sound is described in which the driving-point impedance of a loudspeaker connected to a closed tube of variable length is the frequency-controlling element of a bridge-stabilized oscillator. The operation of the system and the accuracy of measurement are analyzed. Results of measurements in air at 1 kc/sec, room temperature, and atmospheric pressure yield, when corrected to standard conditions, a velocity of 331.45 ± 0.05 m/sec. *Subject Heading:* 1. Sound velocity.—*Author's abstract.*

6.9-340

551.596.1:551.578

Ishida, Tamotsu and Onodera, Shigeo, **Sound absorption by snow layer.** *Low Temperature Science, Sapporo, Japan, Ser. A, Physical Sciences*, 12:17-24, 1954. 3 figs., 6 refs., eqs. In Japanese; English summary p. 24. **DWB**—The experimental procedure for obtaining sound absorption coefficients of snow layers is described. The absorption coefficient α_0 is given by the formula $\ln(1 - \alpha_0) = \frac{4l}{c_0} \left(\frac{1}{t} - \frac{1}{t'} \right)$, where l is length of the tube, c_0 is the sound velocity, t' is the decay time when the tube contains snow. *Subject Headings:* 1. Sound absorption 2. Snow cover 3. Absorption coefficients.—*Based on authors' abstract.*

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON NUCLEI IN THE ATMOSPHERE, SECTION B (1951-1955)

By: *Nina A. (Stepanova) Zikeev*

INTRODUCTION

This is the second part of the third in a series of bibliographies on various aspects of Cloud physics. It can be noted here that the first part of this bibliography, dealing with material pertaining to the period prior to and including 1950, contained more items on natural nuclei observations than those concerned with experimental study of artificial nuclei. In the second part, the trend is reversed. On the other hand, the studies of natural nuclei in recent years go into more detail regarding very specific physical properties such as surface tension, adsorption ability, stability, nucleating effectiveness, etc.

SUBJECT OUTLINE

General

Literature reviews, 6I-15, -82, -142
Nuclei classifications, 6I-36, -142
Symposium on condensation nuclei, 6I-139, -150 to -152
Theories, 6I-8, -19, -27, -29, -30, -40, -43, -58, -59, -70, -74, -78, -80, -88, -103, -106, -111, -119, -120, -133, -137, -138, -145, -149, -157 to -159, -162, -165
Experiments, 6I-9, -20, -26, -52, -56, -57, -60, -87, -90, -93, -101, -117, -118, -142, -156 to -158, -160, -162

Nuclei origin

Nuclei sources, 6I-1, -11, -12, -15, -32, -40, -45, -73, -74, -81, -88, -120, -121, -137
Artificial nuclei production, 6I-16, -26, -47, -85, -89, -93, -101, -104, -130, -142, -143

Physical properties

Adsorption, 6I-2, -3, -131
Supersaturation, 6I-156, -157
Surface tension, 6I-29

Dimensions

Mass, 6I-88
Size, 6I-4, -5, -10, -15, -17, -19, -24, -30, -31, -33, -44, -51, -58, -62, -65, -66, -67, -72, -75, -76, -78, -88, -93, -98, -99, -103, -104, -112, -113, -117, -120, -126, -134, -135, -144
Surface dimensions, 6I-34

Weight, 6I-28

Shape, 6I-5, -23, -35

Motion

Diffusion, 6I-119, -148
Trajectories, 6I-136

Charges

Charged, 6I-27, -129
Uncharged, 6I-27
Stability, 6I-12, -27

Solubility

Soluble, 6I-12, -43, -135, -136
Insoluble, 6I-43, -70
Hygroscopic, 6I-14, -45, -50, -73, -108, -144
Wettable, 6I-12
Unwettable, 6I-12
Effectiveness, 6I-87, -165

Type

Crystalline nuclei, 6I-57, -108, -135, -163
Cirrus crystal nuclei, 6I-30
Combustion nuclei, 6I-30, -44, -50
Fog nuclei, 6I-14, -136
Ice nuclei, 6I-21, -38, -43, -52, -102, -110, -114, -115, -116, -122, -130, -137, -140, -141, -143, -144, -145, -154, -161, -165
Giant nuclei, 6I-76, -126, -134
Large nuclei, 6I-46, -48, -76, -81, -105, -110, -112, -132
Liquid nuclei, 6I-36, -46, -107
Meteoric nuclei, 6I-69, -106, -132, -138
Natural nuclei, 6I-49, -154
Small nuclei, 6I-36, -85, -105
Snow crystal nuclei, 6I-13, -30, -161
Soil nuclei, 6I-57
Sublimation nuclei, 6I-8, -15, -60, -78, -120, -142
Submicroscopic nuclei, 6I-147
Sun-born nuclei, 6I-44
Volcanic nuclei, 6I-110

Chemical properties

Ammonium nuclei, 6I-47
Ammonium sulfate nuclei, 6I-76
Calcium chloride nuclei, 6I-107, -118
Carbon dioxide nuclei, 6I-21
Chloride nuclei, 6I-32, -61, -71, -72, -125, -136, -154, -155
Lead iodide nuclei, 6I-131

- Lithium chloride nuclei, 6I-118
 Magnesium chloride nuclei, 6I-4, -33, -79
 Pampa dust nuclei, 6I-34
 Quartz nuclei, 6I-34
 Radioactive nuclei, 6I-6, -14
 Salt nuclei, 6I-1, -10, -17, -18, -19, -22, -28, -29, -31, -33, -35, -36, -48, -65, -66, -67, -76, -77, -79, -81, -91, -105, -107, -111, -112, -118, -119, -127, -134, -135, -146
 Sea spray nuclei, 6I-4, -5, -40
 Silver iodide nuclei, 6I-3, -9, -20, -21, -23, -26, -34, -38, -60, -77, -89, -90, -101, -119, -122, -131, -141, -143, -160, -163, -165
 Sodium nuclei, 6I-36, -56, -63, -82, -107, -154
 Sulfuric nuclei, 6I-16, -19, -104, -136
 Zinc sulfide nuclei, 6I-141
- Processes**
 Nuclei formation, 6I-45, -47, -57, -70, -115, -162
 Nuclei growth, 6I-12, -45, -62, -75, -105, -111, -162
 Nuclei decay, 6I-9, -12, -20, -23, -26, -42, -101
- Meteorological relationships**
 Air masses, 6I-18, -37, -55, -61, -68, -71, -73, -91, -96, -101, -105, -140, -146
 Atmospheric conductivity, 6I-11, -41, -86, -153
 Atmospheric radioactivity, 6I-39
 Clouds, 6I-20, -48, -68, -69, -78, -81, -111, -120, -123, -127, -141, -146
 Fog, 6I-102, -121
 Haze, 6I-44

- Humidity, 6I-5, -7, -17, -19, -22, -39, -67, -95
 Inversions, 6I-11, -78, -146
 Rain, 6I-22, -69, -95, -106, -121, -127, -146
 Snow, 6I-102
 Sunshine, 6I-20, -23, -49, -60, -101, -123
 Temperature, 6I-7, -39, -102, -115, -117, -160
 Visibility, 6I-44, -48, -49, -68, -81
 Wind, 6I-7, -18, -28, -39, -48, -68, -91, -94, -95, -100, -105, -127, -134, -141
 Weather situation, 6I-32, -39, -138
 Nuclei and atomic explosions, 6I-6, -129
 Nuclei and ultraviolet radiation, 6I-9, -26, -38, -47, -60, -74, -77, -101
 Nuclei eliminating agents, 6I-121
 Instruments and methods, 6I-22, -24, -25, -31, -33, -34, -38, -42, -46, -50, -54, -55, -56, -61, -65, -66, -68, -71 to -73, -83 to -85, -89, -91 to -99, -109, -122, -124, -125, -147, -158, -161, -163
Observational data
 Nuclei count, 6I-15, -86, -97, -112, -116, -121
 Annual variations, 6I-96, -100, -116
 Diurnal variations, 6I-18, -22, -37, -49, -68, -73, -78, -92, -96, -100, -123
 Vertical distribution, 6I-11, -64, -78, -91, -124, -127, -155
 Graphical distribution, 6I-32, -33, -37, -53, -55, -78, -94, -112, -113, -121, -128, -136, -146
 Ions, 6I-8, -22, -41, -66, -76, -88, -148, -158, -164

GEOGRAPHIC OUTLINE

NORTH AMERICA

United States

- Block Island, R. I., 6I-28
 Mt. Washington, N. H., 6I-116, -136
 Socorro, N. Mex., 6I-61

Panama, 6I-132

Puerto Rico, 6I-155

EUROPE, 6I-102

Alps, 6I-102

Baltic Sea, 6I-94, -95

Ireland

- Dublin, 6I-55
 Valentia, 6I-139

France

- Puy-de-Dôme, 6I-161
 Trappes, 6I-22

Germany

- Berlin, 6I-92
 Frankfurt a/M., 6I-76
 Usedom, 6I-94, -95
 Weissenau, 6I-140

Italy

- Mt. Cimone Observ., 6I-71, -72

Switzerland, 6I-97

- Basel, 6I-68, -100, -123, -139
 St. Moritz, 6I-123

ASIA

Japan

- Mt. Azama, 6I-110
 Mt. Zaō, 6I-93
 Sendai, 6I-17

Pakistan

- West Pakistan, 6I-73, -134

Sea of Japan, 6I-18

AFRICA, 6I-138

AUSTRALIA, 6I-146

ATLANTIC OCEAN, 6I-41, -53, -81, -136

North Atlantic, 6I-7, -86, -112, -113

PACIFIC OCEAN

North Pacific, 6I-107, -108, -127

Western Pacific, 6I-18

1951

6I-1 551.510.41:551.574.1

Boyce, Steve G., **Source of atmospheric salts.** *Science*, 113(2944):620-621, June 1, 1951. 10 refs. DWB—The author reviews briefly various proposed suggestions of the manner in which atmospheric salts are derived from the ocean and describes experiments on the measurement of the downward movement of salts. Evidence indicates that the majority of airborne droplets carrying salt originated from bursting bubbles of the swash and spume. (Same item as 3.6-63, June 1952, MAB.) **Subject Headings:** 1. Salt nuclei 2. Nuclei sources.—I.L.D.

6I-2 551.574.1

Coulter, Lowell Vernon, **The role of surface forces in water vapor adsorption on foreign nuclei.** Boston University, Contract AF 19(122)-361, Report No. 1, Jan. 31, 1951. 7 p. fig. DWB—An attempt is made to test the assumption that significant differences in the adsorption properties of foreign nuclei may be reflected in differences of the capacity of nuclei to bring about the formation of water droplets. The author discusses the determination of the adsorption isotherm and describes the adsorption equipment, the volumetric procedure and the gravimetric procedure. The selection of adsorbents is discussed. (Same item as 3.4-185, April 1952, MAB.) **Subject Headings:** 1. Nuclei adsorption properties 2. Droplet formation.—I.L.D.

6I-3 551.574.1

Coulter, Lowell Vernon; Kland-English, Mathilde June and Zdanuk, Edward, **The role of surface forces in water vapor adsorption on foreign nuclei.** The adsorption of water vapor on silver iodide. Boston University, Contract AF 19(122)-361, Report No. 4, Dec. 3, 1951. 8 p. 2 figs., 4 refs. DWB—The 34°F adsorption isotherm of water on AgI has been completed. The isotherm exhibits a sharp rise in adsorption at $P/P_0 \cong 0.5$ which is tentatively regarded as an indication of the coexistence of two phases in a localized monolayer. (Same item as 4.1-165, Jan. 1953, MAB.) **Subject Headings:** 1. Silver iodide nuclei 2. Nuclei adsorption properties.—Authors' abstract.

6I-4 551.574.1

Facy, L. (Paris), **Éclatement des lames minces et noyaux de condensation.** [Bursting of thin films and condensation nuclei.] *Journal Scientifique de la Météorologie*, Paris, 3(11):86-98, July/Sept. 1951. 2 figs. DWB—Electron microscope analysis of sea spray obtained when bubbles burst reveals the composition of condensation nuclei in different size ranges, as well as the relative and absolute nuclei size distribution. Mechanics of formation and bursting of bubbles or films, of collecting and photographing and, finally, of analysis are described and illustrated. Theory of drop shattering is treated in detail and natural description compared with description of artificially produced films in the laboratory. Many excellent photomicrographs are reproduced. Conclusion is that bursting produces numerous drops between 10^{-6} and 10^{-2} cm composed of $MgCl_2$, with relatively few $NaCl$ nuclei in the lower range. Between 10^{-4} and 10^{-3} the nuclei are nearly always surrounded by $MgCl_2$, sometimes with $NaCl$ and more rarely with sulfates or carbonates of Na or Mg as nuclei. It is estimated that the rate of sea salt nuclei production on the earth is $10^6/cm^2/sec$. (Same item as 3.11-175, Nov. 1952, MAB.) **Subject Headings:** 1. Sea spray nuclei 2. Nuclei size 3. Magnesium chloride nuclei 4. Electron microscope studies.—M.R.

6I-5 551.574.1

Facy, L., **Embruns et noyaux de condensation.** [Sea spray and condensation nuclei.] *Journal Scientifique de la Météorologie*, Paris, 3(10):62-68, April/June 1951. 6 figs., 9 refs. French, English and Spanish summaries p. 62. MH-BH—It was found that large drops of sea spray can be split into numerous condensation nuclei when humidities are low (30-35%). Photographs are presented showing size, shapes and spacing of nuclei when formed in the laboratory under various conditions of humidity and air flow. There is also a discussion of the differences between natural and laboratory conditions and of the size and chemical content factors. (Same item as 2.11-132, Nov. 1951, MAB.) **Subject Headings:** 1. Sea spray nuclei 2. Nuclei size 3. Nuclei shape 4. Nuclei and humidity.—M.R.

6I-6 551.594.14:551.574.1

Garrigue, Hubert, **L'invasion d'air radioactif d'origine atomique et son influence sur les précipitations atmosphériques.** [The invasion of air which is radioactive from atomic origin and its influence on precipitation.] *Académie des Sciences, Paris, Comptes Rendus*, 232(10):1003-1004, March 1951. DWB—The author concludes that although the principal area of contamination from an atomic explosion is rather restricted, radioactive condensation nuclei will cover a large portion of the globe. (Same item as 4.6-239, June, 1953, MAB.) **Subject Headings:** 1. Radioactive nuclei 2. Nuclei and atomic explosions.—G. C. Bristow.

6I-7

551.574.1

Hess, Victor F., **Further determinations of the concentration of condensation nuclei in the air over the North Atlantic.** *Journal of Geophysical Research*, 56(4):553-556, Dec. 1951. 2 tables, 5 refs. **DWB**—Condensation nuclei counted on voyage from New York to Le Havre and back (summer 1951). Results presented with weather observations. Air in the western half of the Atlantic contained more nuclei (summer 1951). Results presented with weather observations. Air in the western half of the Atlantic contained more nuclei (1512 and 1229 cm³) than in the eastern half (462 and 887 cm³). (*Same item as 4.10-191*, Oct. 1953, *MAB.*) *Subject Headings:* 1. Nuclei geographical distribution 2. Nuclei and temperature 3. Nuclei and wind 4. Nuclei and humidity 5. North Atlantic.—A.A.

6I-8

551.574.1

Hosler, Charles L., **On the crystallization of supercooled clouds.** *Journal of Meteorology*, 8(5):326-331, Oct. 1951. 2 figs., 2 tables, 15 refs. **DLC**—Experiments in a cold chamber indicate that the crystallization of supercooled clouds cannot be explained on the basis of the concept of sublimation nuclei. Materials that are not crystalline and others which do not have a crystalline form and dimensions resembling ice, exhibit the ability to produce ice crystals in a cloud. The effectiveness of some substances in crystallizing clouds appears to be related to the part they may play in altering the surface structure of small drops. All of the active materials provide polarizable ions or molecules which, on entering the surface of droplets, lower the surface free energy. This lowering of the energy may permit the small droplets to change to ice crystals with a decrease in the energy of the system, whereas in the absence of the polarizable ions, the increase in surface energy upon freezing would exceed the decrease in internal energy and thus the change of state could not take place. (*Same item as 3.4-187*, April 1952, *MAB.*) *Subject Headings:* 1. Sublimation nuclei 2. Polarizable ions 3. Nuclei theories.—*Author's abstract.*

6I-9

551.574.1:551.509.67:548.5

Inn, Edward C. T., **Photolytic inactivation of ice-forming silver iodide nuclei.** *American Meteorological Society, Bulletin*, 32(4):132-136, April 1951. 6 refs. **MH-BH**—AgI crystals are decomposed photolytically by the action of light having wave lengths below 4300 Å. Photolysis is reversible when crystals are exposed to subdued light. Exposure of silver iodide nuclei to wave lengths, 4300 Å and less, of a quartz mercury arc light source for 10-20 min destroys their capacity to form ice particles when injected into a cloud of supercooled water droplets. Exposure of photolyzed AgI nuclei to subdued light in a darkened room either did not bring about complete recovery from photolysis or had no effect at all. It is suggested that the surface-structure-sensitive process of ice nucleation by AgI is destroyed when the entire surface layer has been decomposed photolytically. (*Same item as 3.8-137*, Aug. 1952, *MAB.*) *Subject Headings:* 1. Nuclei experiments 2. Nuclei and UV radiation 3. Silver iodide nuclei 4. Nuclei decay.—I.L.D.

6I-10

551.510.42:551.574.1

Junge, Christian, **Das atmosphärische Aerosol.** [The atmospheric aerosol.] *Umschau*, Frankfurt a.M., 51(2):647-649, Nov. 1951. 2 figs., ref. **DLC**—Frequency and size distribution of aerosol particles of different origin are investigated and presented in graphs. Maritime aerosols furnish more than one third of the total quantity of aerosols. Most of the larger particles, even over South and Central Germany, during invasion of Atlantic air masses, are sea salt. Some aspects of cloud and precipitation formation are briefly mentioned and the author also refers to possibilities of artificial nucleation of clouds and experiments undertaken in that field by American scientists. (*Same item as 3.6-64*, June 1952, *MAB.*) *Subject Headings:* 1. Nuclei size distribution 2. Salt nuclei 3. Cloud seeding.—G.T.

6I-11

551.551:551.574.1 551.510.534

Junge, Christian, **Austausch und grossräumige Vertikalverteilung von Luftbeimengungen.** [Exchange and large scale vertical distribution of aerosols.] *Annalen der Meteorologie*, 4(7/9):380-392, 1951. 8 figs., 4 tables, 15 refs. German and English summaries p. 380. **DWB**—Assuming a steady supply of small particles into the air over Europe and the Austausch coefficient, the vertical distribution of particles is calculated and compared with measurements up to 4½ km and with potential gradient. Variations are related to wind speed and Austausch below and above inversions. It is concluded that in 2-4 km aerosols are mostly of European origin, above that non-European. Practically all aerosols even over oceans are of continental origin, and change in height distribution when supply stops is calculated. Author then discusses on similar lines distribution of ozone originating in the stratosphere, but fails to find expected results. (*Same item as 3.9-151*, Sept. 1952, *MAB.*) *Subject Headings:* 1. Nuclei vertical distribution 2. Nuclei and potential gradient 3. Nuclei and inversions 4. Nuclei sources.—C.E.P.B.

6I-12

551.574.1

†Junge, Christian, **Nuclei of atmospheric condensation.** (In: *Compendium of meteorology.* Boston, American Meteorological Society, 1951. p. 182-191. 4 figs., 4 tables, 48 refs.) **MH-BH**—The three types of particles which can serve as condensation nuclei are first described (unwettable, wettable and soluble) and the physical conditions which affect each kind outlined. A handy table shows relative sizes and magnitude of the ions, types and sources of nuclei or parameters involved in this field of study (range 2×10^{-7} to 2×10^{-3} cm) under varying conditions (ocean, country and city air). The size, number and methods of measurement; form and physical stability of nuclei, curves of growth relative to humidity or saturation; formation in smoke, mechanical sources, electrostatic charges, optical effects, processes of destruction (sedimentation, diffusion and coagulation), rate of decrease depending on particle size and, lastly, suggestions for future study. The future progress is said to depend on development of new methods for measurement of the whole spectrum of nuclei. At present methods give only the order of magnitude. Ion counting alone has not been proven accurate. (Same item as 4.3-10, March 1953, *MAB.*) *Subject Headings:* 1. Soluble nuclei 2. Wettable nuclei 3. Unwettable nuclei 4. Nuclei sources 5. Nuclei stability 6. Nuclei growth 7. Nuclei decay.—*M.R.*

6I-13

551.578.41

Kumai, Motoi, **Electron-microscope study of snow-crystal nuclei.** *Journal of Meteorology*, 8(3):151-156, June 1951. 13 figs., 4 tables, 6 refs. **DWB**—The method of preparing nuclei specimens of snow crystals for study with the electron microscope is described. Microphotographs of snow nuclei crystals are given and the structure of the nuclei is analyzed. A mechanism for snow crystal growth is suggested. (Same item as 3.4-210, April 1952, *MAB.*) *Subject Headings:* 1. Snow crystal nuclei 2. Snow crystal formation 3. Electron microscope studies 4. Nuclei structure.—*I.L.D.*

6I-14

551.575.1

Kuroiwa, Daisuke, **Electron-microscope study of fog nuclei.** *Journal of Meteorology*, 8(3):157-160, June 1951. 12 figs., 5 refs. **DWB**—The application of electron microscopy to the study of fog nuclei is described. Microphotographs of fog nuclei are presented. It is concluded that sea fog nuclei contain both hygroscopic and non-hygroscopic nuclei. (Same item as 3.6-135, June 1952, *MAB.*) *Subject Headings:* 1. Electron microscope studies 2. Fog nuclei 3. Hygroscopic nuclei.—*I.L.D.*

6I-15

551.574.1

†*Mason, Basil John and Ludlam, F. H., **The microphysics of clouds.** *Physical Society of London, Reports on Progress in Physics*, 14:147-195, 1951. 9 figs., 14 plates, 5 tables, 71 refs., 14 eqs. **DLC**—In this comprehensive review of recent literature on the subject the nature of condensation nuclei, their numbers, sizes and actions are also discussed. Sec. 5 deals with experiments on initial stages of ice formation, freezing and sublimation nuclei and supercooling. (Same item as 3.3-173, March 1952, *MAB.*) *Subject Headings:* 1. Nuclei sources 2. Nuclei count 3. Nuclei size 4. Sublimation nuclei 5. Literature reviews.—*C.E.P.B.*

6I-16

551.574.1:551.508.91

Montreal. University. Physical Chemistry Laboratory, **Studies on the mechanism of nucleation.** Contract AF-19(122)-380, Progress Report, No. 1, Jan. 1-April 1, 1951. 4 p. refs. **DWB**—A brief preliminary report on progress in development of an apparatus for producing (and controlling) a certain degree of supersaturation in air filled with water vapor, and another device for producing condensation nuclei which can be introduced into the first apparatus and the number of nuclei determined readily. The LaMer-Sinclair aerosol generator makes use of H_2SO_4 vapor as nucleating agent, and it is being adopted to produce an aerosol of dibutyl phthalate which would lend itself to determinations of particle size and concentration. *Subject Headings:* 1. Supersaturation generators 2. Artificial nuclei production 3. Sulfuric acid nuclei. I. Gendon, Pierre R.—*M.R.*

6I-17

551.574.1:551.591.1

†Ogiwara, S. and Ôkita, T., **The size distribution of sea-salt nuclei and its contribution to visibility.** *Meteorological Society of Japan, Journal*, Ser. 2, 29(4):119-129, April 1951. 10 figs., 2 tables, 15 refs., 11 eqs. In Japanese; English summary p. (129). **MH-BH**—Observations made near Sendai, Japan, are discussed and illustrated by electron microscope photographs of particles and curves showing frequency distribution of size of particles observed in the atmosphere. The size distribution is represented by the formula $N_0 \gamma_0^3 = C$ where $N_0 \Delta \gamma_0$ is the number of sea-salt nuclei contained in 1 cc of the atmosphere, and $C = 2.2W \times 10^3$, where W is the amount of sea-salt in 1 cc of the atmosphere. Relative humidity variations with respect to number and size of nuclei and, finally, visibility (opacity) with respect to relative humidity are formulated and presented graphically.

Results also calculated for Valentia data in terms of the authors. (Same item as 2.11-134, Nov. 1951, MAB.) *Subject Headings:* 1. Sea-salt nuclei 2. Nuclei size distribution 3. Nuclei and humidity 4. Sendai, Japan.—M.R.

6I-18

551.574.1(265)

*Ohta, S., On the contents of condensation nuclei and uncharged nuclei on the Pacific Ocean and the Japan Sea. *American Meteorological Society, Bulletin*, 32(1):30-31, Jan. 1951. 3 figs., table. MH-BH—Observations made with an Aitken counter on a ship for a week in Aug. 1948 in the Pacific Ocean near Japan (67 observations) and during May 1948 on the coast of Rebun Island in the Sea of Japan (115 observations) are compared. Values on the Pacific Ocean are smallest ever obtained on an ocean. No diurnal change was found over ocean—some change (increase in mid-day) over Sea of Japan. A sudden decrease was attributed to change in air mass. No change was noted with change of wind speed. (Same item as 2.9-119, Sept. 1951, MAB.) *Subject Headings:* 1. Nuclei diurnal variations 2. Salt nuclei 3. Nuclei and air masses 4. Nuclei and wind 5. Sea of Japan 6. Western Pacific.—M.R.

6I-19

551.574.1

Ohta, S., Vapour pressure of a small solution particle. [Pt. 5 of] Studies on condensation nuclei. *Journal of Meteorological Research*, Tokyo, 3(2):45-50, Jan. 1951. fig., table, 5 refs., eqs. In Japanese; English summary p. (2). DWB—Equations for vapor pressure of a small solution particle are derived from the differential equations of thermal equilibrium and also from the virtual change of free energy. The relation between the radius of the particle and the relative humidity at the critical conditions was calculated numerically for nuclei consisting of H_2SO_4 and NaCl. (Same item as 3.6 131, June 1952, MAB.) *Subject Headings:* 1. Nuclei size 2. Nuclei and humidity 3. Salt nuclei 4. Sulfuric acid nuclei 5. Nuclei theories.—From author's abstract.

6I-20

551.574.1

Reynolds, S. E.; Hume, Wm., Jr.; Vonnegut, Bernard and Schaefer, Vincent J., Effect of sunlight on the action of silver iodide particles as sublimation nuclei. *American Meteorological Society, Bulletin*, 32(2):47, Feb. 1951. 3 refs. DWB—Photochemical deterioration of AgI nuclei has been studied by the New Mexico School of Mines, in Socorro, N. M. and by the General Electric Research Laboratories in Schenectady, N. Y. Methods and installations are briefly described. At both places it has been found that under dark conditions the number of active nuclei decreased about one order of magnitude in twenty-four hrs. Decay rate under conditions of radiation by sunlight showed great variation with very light cloud cover and with the hour of day, but in general the number of effective nuclei decreased about two orders of magnitude per hr. Authors conclude that far greater quantities of AgI particles will be required for seeding operations in bright sunlight than at night. (Same item as 2.9-120, Sept. 1951, MAB.) *Subject Headings:* 1. Silver iodide nuclei 2. Nuclei and sunshine 3. Nuclei experiments 4. Nuclei decay 5. Nuclei and clouds 6. Cloud seeding.—N.A.S.

6I-21

551.509.67

†Schaefer, Vincent J. (G. E. Lab., Schenectady, N. Y.), Economic aspects of experimental meteorology. (In: United Nations Scientific Conference on the Conservation and Utilization of Resources, Lake Success, N. Y., 1949, Proceedings, v. 4, Water resources, p. 2-27, 1951. 23 figs., 29 refs.) DWB—A carefully prepared report, with numerous photographs, showing some effects of cloud seeding, mostly with dry ice. A general review is given about nuclei and the atmosphere, causes of natural precipitation, fundamental experiments in cloud physics and requirements for cloud seeding. A diagram shows the temperature dependence of ice nuclei on different natural substances which may occur as aerosols in the atmosphere. The greatest activity occurs with CO_2 at $0^\circ C$ or lower, and in less degree with AgI, which obtains full activity at $-10^\circ C$. (Same item as 4.4-82, April 1953, MAB.) *Subject Headings:* 1. Ice nuclei 2. Silver iodide nuclei 3. Carbon dioxide nuclei 4. Cloud seeding.—A.A.

6I-22

551.508.91:551.574.1

Soudain, G. (*Élab. d'Études et de Rech. Mét., Trappes*), Réalisation d'un compteur automatique de noyaux de chlorure de sodium. [Construction of an automatic counter for sodium chloride nuclei.] *Journal Scientifique de la Météorologie*, 3(12):137-142, Oct./Dec. 1951. 5 figs., 4 refs., eqs. French, English and Spanish summaries p. 137. MH-BH—Based on a principle suggested by FINDEISEN (1939), the author has constructed a device which will register the number of Na^+ ions in a given sample of air. It is assumed that most of the Na ions are due to NaCl, so the results would give the number of saline nuclei in the atmosphere which is sampled. The apparatus consists of an enclosed bunsen burner into which flame the air is drawn, protective devices to prevent contamination from other sources, a projecting lens, a light filter, a photoelectric cell, an amplifier and a recorder. The system can record up to 6 impulses a sec, thus enabling it to analyze 350 cc

of air per sec. It cannot detect particles of $\text{NaCl} > 10^{-4}$ cm. Because of heating in the photoelectric cell, the device can be operated only 15 min per hour. Results of 3 months of operation at Trappes, France are summarized and sample records shown. Interesting discoveries were: 1) extreme variability in count from one minute to the next (due to turbulence) and 2) diminution of number of saline particles during high humidity or precipitation. A maximum number was frequently observed between 15^h and 18^h , and between 23^h and 02^h . Effect of air masses or sea breezes has not yet been analyzed. Apparatus and recording circuits are shown by line drawings. (Same item as 5.10-68, Oct. 1952, MAB.) *Subject Headings:* 1. Sodium ion counter 2. Salt nuclei 3. Nuclei diurnal variations 4. Nuclei and humidity 5. Nuclei and rain 6. Trappes, France.—M.R.

6I-23

551.509.67:551.521.1:551.574.1

Sunlight spoils particles. *Science News Letter*, 59(22):341, June 2, 1951. DWB—Brief report on the findings of EDWARD C. Y. INN that sunlight changes the shape of AgI crystals so that they lose their ice forming capacity. (Same item as 3.5-102, May 1952, MAB.) *Subject Headings:* 1. Silver iodide nuclei 2. Nuclei decay 3. Nuclei shape 4. Nuclei and sunshine.—I.L.D.

6I-24

551.508.91:551.574.1

Thams, J. C. and Wieland, W. (Locarno-Monti, Switzerland), *Die Wirbelbildung im kleinen Scholzischen Kondensationskernzähler*. [The formation of vortexes in a small Scholz condensation nuclei counter.] *Geofisica Pura e Applicata*, Milan, 20:138-156, July/Dec. 1951. 10 figs., 4 tables, 2 refs. English, German and Italian summaries p. 138. MH-BH—The results of measurements made on the ruled plates of a Scholz nuclei counter under varying conditions of speed of expansion (which change the strength of the vortex in the apparatus) are presented. The equipment is illustrated photographically and diagrammatically; methods of measurement and calibration described; accuracy shown on a graph; microphotographs reproduced; methods of fixation described; and data presented to show effect of nuclei density, size, speed of expansion, use of the stirrer and other factors on nuclei count. (Same item as 3.8-53, Aug. 1942, MAB.) *Subject Headings:* 1. Scholz nuclei counter 2. Nuclei size 3. Nuclei size measurement methods.—M.R.

6I-25

551.508.91

Vonnegut, Bernard, Continuous recording condensation nuclei meter. General Electric Research Laboratory, Schenectady, N. Y., Contract DA-36-039-Sc-15345, Project Cirrus, Final Report, July 30, 1951. p. 156-179. 13 figs., 5 refs. DWB—Account of continuous measurement of concentration of condensation nuclei by introducing air into a cloud chamber where it is humidified and expanded. The data are obtained from measurement of the light scattered by the cloud drops. Experiments made at Schenectady, Albuquerque and from an airplane are described and curves representing the recorded measurements reproduced. Conclusions are said to be premature but automatic recording condensation nuclei meter is claimed to show promise of being a valuable tool for investigating meteorological phenomena and air pollution problems. Instruments are illustrated in detail and numerous records reproduced. (Same item as 3.4-66, April 1952, MAB.) *Subject Heading:* 1. Continuous nuclei recorder.—G.T.

6I-26

551.574.1:551.509.67

Vonnegut, Bernard and Neubauer, Raymond, Recent experiments on the effect of ultraviolet light on silver iodide nuclei. *American Meteorological Society, Bulletin*, 32(9):356, Nov. 1951. 2 refs. DWB—Experiments have been carried out in which AgI smoke produced by burning impregnated charcoal was placed in a box with ultraviolet light in the center. It was found that during each hour the concentration of active ice forming nuclei in the smoke decreased exponentially. In other experiments the concentration was found to decrease to 30%-50% per hour. These results are in marked contrast to the previously published data which indicated 10% to 1% remaining concentration at the end of one hour. It is probable that the effect of sunlight on the AgI is greatly influenced by traces of certain impurities either in the atmosphere or in nuclei. *Subject Headings:* 1. Silver iodide nuclei 2. Artificial nuclei production 3. Nuclei and UV radiation 4. Nuclei decay 5. Nuclei experiments.—N.A.S.

6I-27

551.574.1

†Wilson, J. G., *The principles of cloud-chamber technique*. Cambridge, University Press, 1951. 131 p. 33 figs., 17 tables, 64 eqs., bibliog. p. 128-129. DWB—The first chapter deals with condensation and growth of drops. It contains a brief review of the early work of COULIER and AITKEN on the necessity of nuclei for condensation and a theoretical discussion of the stability of charged drops, of the growth of drops from charged nuclei, of condensation on uncharged nuclei, of condensation in mixed vapors, of the effect of contamination, of re-evaporation nuclei and of the rate of growth of drops. (Same item as 2.9-123, Sept. 1951, MAB.) *Subject Headings:* 1. Charged nuclei 2. Uncharged nuclei 3. Nuclei stability theory.—I.L.D.

6I-28

551.510.41:551.574.1:551.46

Woodcock, Alfred H., **Impact deposition of atmospheric sea salts on a test plate.** Woods Hole Oceanographic Institution, Contract N6onr-27702, Marine Meteorology, Technical Report, No. 10, July 1951. [16 p.] 12 figs., 4 tables, refs. Reprint from: *American Society for Testing Materials, Proceedings*, 50:1115-1116, 1950. DWB—Experiments made in the Block Island region, for determining weight and number of atmospheric sea salt nuclei in marine winds through measurements of deposition on test plates, are reported in this paper and results shown in tables and photomicrographs. Several comments on the work of other experts and the author's evaluation of the same are added. (Same item as 3.4 95, April 1952, MAB.) *Subject Headings*: 1. Sea salt nuclei 2. Nuclei weight 3. Nuclei and wind 4. Block Island, R. I.—G.T.

6I-29

551.574.1

Yamaguchi, S., **On the effect of the radius and concentration of a drop of solution on the surface tension and saturated vapor pressure.** *Meteorological Society of Japan, Journal*, 2nd Ser., 29(11):384-388, Nov. 1951. 2 figs., 3 tables, 5 refs., 12 eqs. In Japanese; English summary p. 384. MH-BH—The theory of the effect of the radius and concentration of a drop of solution upon the surface tension is applied to a drop of NaCl solution. An outline is given of previous investigations published in English by different authors. The author emphasizes that the vapor pressure over a very small nucleus (about 10^{-16} g) with concentrated solution of NaCl is very different from the commonly accepted value. (Same item as 4.1-168, Jan. 1953, MAB.) *Subject Headings*: 1. Salt nuclei 2. Nuclei surface tension theory.—A.A.

1952

6I-30

551.574.1:551.578.41

aufm Kampe, Hans Joachim; Weickmann, Helmut K. and Kedesdy, H. H., **Remarks on "Electron-microscope study of snow-crystal nuclei."** *Journal of Meteorology*, 9(5):374-375, Oct. 1952. 5 figs., 11 refs. Also: Kumai, Motoi, Reply. *Ibid.*, p. 375-376. MH-BH—The authors contest M. KUMAI's snow-crystal growth theory which explains the growth as due to condensation of minute drops which are formed by condensation of water vapor on aerosol particles in the free atmosphere under snow conditions. A study of some pictures of cirrus-crystal nuclei obtained by the authors revealed a similarity to some pictures studied by M. KUMAI, but all of them showed solid aerosol particles as nuclei. The authors concluded that submicroscopic droplets do not exist within those clouds and the nuclei which KUMAI found on his snow crystals are combustion nuclei or dust, ranging between 10^{-6} - 10^{-3} cm in size. KUMAI replies that the observations made by the authors can not make sure that the minute droplets do not exist in natural clouds of snow conditions, since these minute droplets are very difficult to obtain for observation. (Same item as 4.2-182, Feb. 1953, MAB.) *Subject Headings*: 1. Snow crystal nuclei 2. Cirrus crystal nuclei 3. Combustion nuclei 4. Nuclei size 5. Nuclei theories.—N.A.S.

6I-31

551.574.1:551.508.91

Columbia University. Dept. of Chemistry, **Polydispersity and nucleation in aerosols.** Contract AF-19(122)-164, Final Report, March 31, 1952. 12 p. table, 4+figs. DWB—The size distribution of nuclei in aerosols was investigated, using the Forward Angle Scattering Camera. This device gave excellent results when compared with those of the differential settling technique, which is difficult and not entirely satisfactory. The radii of the nuclei were calculated by means of a conversion curve from the optical density. The degree of polydispersity in terms of the variation coefficient given by the ratio of the standard deviation to the mean value of the radius remains at about 10% for an average linear velocity of flow of about 9 to 18 cm/sec.⁻¹ in the presence of NaCl nuclei and increases with the flow, as well as in the absence of NaCl nuclei. *Subject Headings*: 1. Salt nuclei 2. Nuclei size distribution 3. Nuclei size measurement methods. I. La Mer, Victor K. II. Lee, Pui-Kum.—A.A.

6I-32

551.574.1

Crozier, W. D.; Seely, B. K. and Wheeler, L. B., **Correlation of chloride particle abundance with the synoptic situation on a cross-country flight.** *American Meteorological Society, Bulletin*, 33(3):95-100, March 1952. 3 figs., 10 refs. DWB—An account is given of the collection of airborne chloride particles, by airplane, on a cross country flight. The accompanying meteorological situation is described. The distribution of chloride particles found is consistent with the view that they originated in the Gulf of Mexico and in the Pacific off the coast of Mexico. The greatest abundance of chloride particles was found east of the mountains in southern California, in air that probably came from the region of a tropical storm. (Same item as 4.2-84, Feb. 1953, MAB.) *Subject Headings*: 1. Chloride nuclei 2. Nuclei sources 3. Nuclei and synoptic situations 4. Flight data 5. Nuclei geographical distribution.—Authors' abstract.

6I-33

551.574.1

*Dessens, Henri; Lafargue, C. and Stahl, P., *Nouvelles recherches sur les noyaux de condensation*. [New research on condensation nuclei.] *Annales de Géophysique*, 8(1):21-32, Jan./March 1952. 7 figs., 29 refs. English summary p. 21. DWB—Condensation nuclei found in samples taken from clouds and fog at various geographic locations (such as the Atlantic region, Greenland, Puy-de-Dôme, etc.) have been analyzed with an electron microscope. Data on their size distribution and chemical composition are presented. Photomicrographs showing various types of nuclei are reproduced. It was found that all natural nuclei are composed of the following elements: NaCl, $MgCl_2$ and sea water. Methods of sampling and of microscopic measurement are mentioned. (Same item as 4.9-158, Sept. 1953, MAB.) *Subject Headings*: 1. Nuclei sampling methods 2. Nuclei size distribution 3. Nuclei geographical distribution 4. Salt nuclei 5. Magnesium chloride nuclei.—G.T.

6I-34

551.574.1:551.576.11

Ehrenberg, Wolfgang W., *Beitrag zur Problem der Eisbildung in Wasserwolken*. [Contribution to the problem of ice formation in clouds.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 5(2):158-165, 1952. 3 figs., 4 refs., 4 eqs. German, English and French summaries p. 158. DWB—By spraying glass of container with paraffin or smearing with vaseline, distilled water drops could be supercooled to $-10^{\circ}C$. A method of finding total surface of fine particles is described. Supercooling at formation of ice nuclei increased with log (total surface); quartz, pampa dust, cellulose, volcanic ash, charcoal and AgI prepared by various methods gave rather similar results, so that chemical composition is less important than surface area. An effective area is $1/20\text{ cm}^2$ per 1 cm^3 water. The energy of agitation determines the probability of formation of ice nuclei. Theoretical implications are discussed. (Same item as 4.4-184, April 1953, MAB.) *Subject Headings*: 1. Ice nuclei formation 2. Nuclei surface determination methods 3. Nuclei surface dimensions 4. Pampa dust nuclei 5. Silver iodide nuclei 6. Quartz nuclei.—C.E.P.B.

6I-35

551.574.1

Facy, L., *Forme des microcristaux dans les noyaux de condensation*. [Form of microcrystals in condensation nuclei.] *Journal Scientifique de la Météorologie*, 4(13):9-19, Jan./March 1952. 4 plates, 14 refs. French, English and Spanish summaries p. 9. DWB—Electron micrographs of condensation nuclei give only a rough idea of the nature of the nuclei. Photographs made at Trappes, on Pic du Midi and at sea (Antibes) of various types of NaCl crystals illustrate many difficulties. The author discusses the various forms observed by means of the electron microscope: lozenge, hexagonal, cubes, cube pyramids, needles, plates, globules, crystalline spheres, amorphous forms and complex forms. He shows that in view of the many types of salts in sea air, and the numerous anomalous and varied forms of each salt, it is not possible to identify condensation nuclei by such means unless a preponderance of one salt (e.g. NaCl) is present. (Same item as 4.2-184, Feb. 1953, MAB.) *Subject Headings*: 1. Nuclei shapes 2. Salt nuclei 3. Electron micrographs 4. Microcrystals.—M.R.

6I-36

551.574.1

Facy, L., *Nature et structure des noyaux de condensation*. [Nature and structure of condensation nuclei.] *Journal Scientifique de la Météorologie*, 4(14):68-77, April/June 1952. 2 plates, 5 refs. English and Spanish summaries p. 68. DWB—Smallest condensation nuclei (10^{-6} - 10^{-5} cm) always show liquid structure, because supersaturation of dissolved salt is never great enough to cause embryo germ of crystal (shown by theoretical discussion). Sample photographs of nuclei, made in the high vacuum of an electron microscope, are shown. Such photos show shapeless glassy residues, unless necessary precautions are taken when pumping. Rough classification of the more complex structure of nuclei above 10^{-6} is given. Most condensation nuclei contain sodium chloride. (Same item as 4.10-189, Oct. 1953, MAB.) *Subject Headings*: 1. Small nuclei 2. Salt nuclei 3. Liquid nuclei 4. Sodium chloride nuclei 5. Nuclei classification.—A.A.

6I-37

551.574.1:551.586:615.835

Flach, Emil, *Meteorologisch-bioklimatische Kernzahluntersuchungen im Bereich des Mittelgebirges und der Ostseeküste*. [Meteorobioclimatic nuclei investigations in Mittelgebirge and Baltic coast.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 42:158-164, 1952. 2 figs., table, 10 refs. DWB—Nuclei diurnal variations are studied as an effect of air mass exchange. Continuous records of nuclei count have been made on the Baltic coast, in Mittelgebirge and in big cities. Results are presented by graphs and discussed. Evaluation of health resorts from the bioclimatological viewpoint, considering nuclei variations, is made. (Same item as 4.10-190, Oct. 1953, MAB.) *Subject Headings*: 1. Nuclei diurnal variations 2. Nuclei and air masses 3. Nuclei in city air 4. Nuclei on sea coast 5. Nuclei in health resorts 6. Baltic Coast 7. German Mittelgebirge.—N.A.S.

6I-38

551.574.1:517.512.

General Electric Research Laboratory, Schenectady, N. Y., **Project Cirrus**. Contract DA-36-039-Sc-15345, Second Quarterly Progress Report; Quarterly Progress Report on Project Cirrus No. 17, Jan. 31, 1952. DWB—In this report prepared by V. J. SCHAEFER, a list of the 6 active members on the project is presented. Investigation on large scale cyclic periodicities in weather on ice nuclei, on ice crystals formed by sudden expansion of air and on silver iodide nuclei exposed to ultraviolet radiation is briefly summarized. Instruments used during the period covered by the report include cloud chamber, flame particle detector, flight instruments and airborne silver iodide generator. *Subject Headings:* 1. Ice nuclei 2. Silver iodide nuclei 3. Nuclei and UV radiation 4. Nuclei instruments. I. Schaefer, Vincent J.—G.T.

6I-39

551.574.

*§General Electric Research Laboratory, Schenectady, **Project Cirrus**. Contract DA-36-039-Sc-15345, DA Project 3-90-07-022, Sc Project 24-172B-0, 6th Occasional Report; Occasional Report No. 35 on Project Cirrus, Aug. 1, 1952. 34 p. 9 figs., tables, refs. DWB—Some 700 measurements of ice-nuclei concentrations are tabulated with accompanying temperature, wind and humidity data and notes on the weather situation. These values are part of the 11,800 ice-nuclei-concentration data obtained at Mt. Washington Observatory in three-hourly continuous measurement since Jan. 1, 1948. Counting, evaluation and classification methods are briefly described. The effect upon ice-nuclei concentration of some special phenomena which occurred during the period (such as smoke palls, dust storms, radioactivity) is discussed. The development of these weather phenomena is shown on weather maps. The author believes that the Mt. Washington series of ice-nuclei counts may be the largest collection of its kind. *Subject Headings:* 1. Nuclei and synoptic situation 2. Nuclei and temperature 3. Nuclei and humidity 4. Nuclei and wind 5. Nuclei and atmospheric radioactivity. I. Schaefer, Vincent J.—G.T.

6I-40

551.574.

Grabovskii, R. I., **Mirovoj okean kak istochnik atmosferykh iader kondensatsii**. [The world ocean as a source of condensation nuclei.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizicheskaja*, 2:56-74, 1952. 2 figs., 5 tables, 36 eqs. DLC—The various hypotheses concerned with the origin of atmospheric condensation nuclei, namely the continental, cosmic and marine hypotheses, are discussed critically. A thorough analysis is made of the marine hypothesis which attributes the origins of atmospheric condensation nuclei to the action of wind upon the sea surface and the resulting spray formation. An approximate calculation of the annual amount of salt entering the atmosphere from the sea surface is made and the quantity of chlorides removed from the atmosphere in the form of condensation nuclei of precipitation is estimated. Conclusive evidence is presented indicating that spray from sea water plays a fundamental role in the salt balance of the earth and is the source of condensation nuclei. (Same item as 4.2-185, Feb. 1953, MAB.) *Subject Headings:* 1. Theories on nuclei origin 2. Nuclei sources 3. Sea spray nuclei.—I.L.D.

6I-41

551.594.13

551.508.9

Hess, Victor F. and Parkinson, W. D., **Small ion balance over the ocean**. Fordham University Dept. of Physics, Contract AF 19(122)-409, Dec. 1952. 42 p. 10 figs., tables, 6 refs. DWB—Positive conductivity and Aitken nuclei densities were measured on a double crossing of the North Atlantic. Most of the data conforms to the equation of ion balance. Radioactivity measured in fog indicates probable RaC content. A self-recording conductivity meter with a vibrating reed electrometer, which is unaffected by the motion of the ship, is described in some detail. Results are discussed for thick and thin walled ionization chambers. (Same item as 5.5-238, May 1953, MAB.) *Subject Headings:* 1. Ion balance 2. Nuclei and atmospheric conductivity 3. Radioactive nuclei 4. North Atlantic Ocean.—A.A.

6I-42

551.508.9:551.50

Hosler, Charles L.; Burkhard, Marvin D. and Neuberger, Hans, **On the effect of time lapses between sampling and expansion in the Aitken nuclei counter**. *American Meteorological Society Bulletin*, 33(6):251-254, June 1952. fig., table, 8 refs. MH-BH—Previous and more recent comparisons of electron microscopic and conventional nuclei counts show that the Aitken counts are deficient. Special experiments revealed that the cause for this deficiency lies in the rapid decay of nuclei in the time lapse between sampling and counting nuclei concentration in the counter by roughly 50%. When this decay is considered, the Aitken and electron microscopic counts can be brought into good agreement. (Same item as 5.9-218, Sept. 1954, MAB.) *Subject Headings:* 1. Electron microscope studies 2. Aitken nuclei counter 3. Nuclei decay.—Authors' abstract.

6I-43

551.574

Junge, Christian, **Bemerkungen zur Frage der Eiskeimbildung im frostübersättigten Bereich** [Remarks on formation of ice nuclei in the frost-supersaturated region.] *Archiv für Meteorologie*

Geophysik und Bioklimatologie, Ser. A, 5(1):44-55, 1952. 3 figs., 3 tables, 10 refs. German, English and French summaries p. 44-45. DWB—Author attempts to bring the modern theories of the operation of freezing nuclei into accord with the observed fact that most condensation nuclei are partly soluble and partly insoluble. He suggests that nuclei are only effective in dilute solutions, and distinguishes between those used in the condensation process and smaller ones which are not FINDEISEN's types I and II). (Same item as 3.11-176, Nov. 1952, MAB.) Subject Headings: 1. Freezing nuclei theory 2. Soluble nuclei 3. Insoluble nuclei 4. Findeisen theory.—C.E.P.B.

6I-44

551.574.1

Junge, Christian, *Gesetzmässigkeiten in der Grössenverteilung atmosphärischer Aerosole über dem Kontinent*. [Regularities in the size distribution of atmospheric aerosols over the continent.] Germany. *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 35:261-277, 1952. 3 figs., 10 tables, 13 refs., eqs. MH-BH—Various measurements of diameter of natural aerosols are combined in diagrams and classified. Measurements at Frankfurt a.M. are then analyzed, and origin 24 and 48 hrs previously marked from air paths. Sizes of particles from combustion of various materials show a rough cubic law and their combination in town smoke and coagulation increase the agreement. This distribution explains many features of visibility in haze. (Same item as 3.11-177, Nov. 1952, MAB.) Subject Headings: 1. Aerosol analysis 2. Nuclei size 3. Nuclei and visibility 4. Nuclei and haze 5. Combustion nuclei.—C.E.P.B.

6I-45

551.574.1

Junge, Christian, *Das Grössenwachstum der Aitkenkerne*. [The growth-rate of Aitken nuclei.] Germany. *Deutscher Wetterdienst in der US-Zone, Berichte*, No. 38:264-267, 1952. 3 figs., 2 refs. DWB—Methods of measuring growth curves of nuclei with radius 10^{-6} to 10^{-5} cm are described. Growth only occurs with relative humidity $>40\%$; that of larger nuclei increases rapidly above 70% . Radius at 95% is 1.03 to 1.41 times that at 40% . This confirms the view that continental nuclei are of mixed origin. (Same item as 4.4-186, April 1953, MAB.) Subject Headings: 1. Hygroscopic nuclei 2. Nuclei growth 3. Nuclei sources.—C.E.P.B.

6I-46

551.574.1

†Junge, Christian, *Die Konstitution des atmosphärischen Aerosols*. [The constitution of atmospheric aerosols.] *Annalen der Meteorologie, Beiheft*, 1952. 55 p. 42 figs., 12 tables, 40 refs. German and English summaries p. 52-54. DWB—This important monograph first summarizes the size distribution of solid and liquid aerosols and discusses the formation of condensation nuclei. Coagulation is especially important and observations suggest that over continents aerosols are usually of mixed origin. Existing methods of counting are discussed from point of view of constitution of aerosols—Owens dust counter, Zeiss conimeter and a new procedure for observing size changes of large nuclei with relative humidity. Above 70% they are mainly liquid and grow rapidly. Separation of solid and liquid particles is described. Marine nuclei are mainly salt crystals, continental ones have insoluble residues. Pt. 3 describes measurements of artificial and natural nuclei by a conimeter with 2 nozzles, and Pt. 4 measurements of growth by the spider thread method, which show that large nuclei are of mixed origin. Some electron microscope photographs are included. (Same item as 4.3-9, March 1953, MAB.) Subject Headings: 1. Aerosol analysis 2. Nuclei formation 3. Large nuclei 4. Liquid nuclei 5. Owens dust counter 6. Zeiss conimeter.—C.E.P.B.

6I-47

551.574.1:551.521.63

†McHenry, J. J. and Twomey, S. (Physics Dept., Univ. College, Cork), *Condensation nuclei produced by ultraviolet light*. *Royal Irish Academy, Dublin, Proceedings, Sec. A*, 55(3):51-59, May 1952. table, 30 refs. DWB—Critical wave length for nucleus production is probably between 2345 and 2378 Å, and certainly between 2345 and 2399 Å, according to experiments with light transmitted through filters. Numbers of condensation nuclei produced in different gaseous atmospheres studied. It seems likely that ammonia causes the production of condensation nuclei by ultraviolet action in ordinary moist air. The absorption spectra of the constituents of the atmosphere are described and the mechanism of nuclei formation is outlined. (Same item as 5.6-205, June 1954, MAB.) Subject Headings: 1. Ammonium nuclei 2. Artificial nuclei production 3. Nuclei formation 4. Nuclei and UV radiation.—A.A.

6I-48

551.574.1:551.591.1

Moore, D. J., *Measurements of condensation nuclei over the North Atlantic*. *Royal Meteorological Society, Quarterly Journal*, 78(338):596-602, Oct. 1952. 4 figs., 4 tables, 16 refs. DWB—Counts of condensation nuclei on "Weather Observer" in N. Atlantic (61-59°N, 13-19°W) varied from 77 to 2460/cm³, decreasing with increase of vertical mixing as shown by cloud type (St to Cu) and with winds from open ocean but with no relation to wind speed. Large nuclei ($>10^{-11}$ g) increased markedly with wind speed and wave height. This accounts for observed increase of

opacity with wind speed, wave height and relative humidity (above 80%). (*Same item as 4.2-180*, Feb. 1953, *MAB.*) *Subject Headings:* 1. Nuclei and clouds 2. Nuclei and wind 3. Nuclei and visibility 4. Salt nuclei 5. Large nuclei.—*C.E.P.B.*

6I-49

551.574

Mrose, Helmut E., *Über die Entstehung nicht-anthropogener Kondensationskerne*. [On the origin of non-artificial condensation nuclei.] *Germany. Deutscher Wetterdienst in der US-Zon. Berichte*, No. 42:122-125, 1952. 4 refs. **DWB**—The author claims that the main portion of condensation nuclei in the atmosphere today originates from combustion. According to the findings of BURCKHARD-FLOHN these nuclei have a very low sinking speed, about $\frac{1}{2}$ mm/hr for nuclei with radius of 0.00001 mm and a high floating ability, so that they can be easily transported by air to distant areas. Therefore, the investigation of nuclei of non-human origin must be made in localities which are far from settlements and industries. Nuclei counts have been made at such points and the author has found that the noon time maximum of nuclei concentration can only be explained by the nuclei-forming sunshine effect. He gives the number of nuclei formed in cm^3/min for various days observed during fair weather. Furthermore, it has been determined experimentally that the sun-born nuclei are very short-lived and decay rapidly in darkness. This has led to the conclusion that the sun-born nuclei are actually large ions which disappear through the recombination processes and as neutral particles are rendered inactive because of their small size. The sun-born nuclei are usually so small that they hardly affect the transparency of the atmosphere, and a 50 km visibility range was observed when more than 20,000 nuclei had been counted. (*Same item as 4.7-14*, July 1953, *MAB.*) *Subject Headings:* 1. Natural nuclei 2. Nuclei and sunshine 3. Sun-born nuclei 4. Nuclei diurnal variations 5. Nuclei and visibility.—*N.A.S.*

6I-50

551.574.1:551.508.9

Ogiwara, S. and Okita, T. (*Tohoku Univ., Sendai*), *Electron-microscopic study of cloud and fog nuclei*. *Meteorological Society of Japan, Journal*, 39(4):132-140, April 1952. 2 figs., 2 tables, 6 refs. In Japanese; English summary p. 132. **MH-BH**—Photomicrographs of hygroscopic nuclei captured in clouds and fog and subjected to various treatments, are presented and found to be similar to hygroscopic particles obtained in haze and to combustion particles artificially produced (which are also shown in photographs). The absence of sea salt nuclei in the material examined appears to minimize the importance of sea spray as nucleating substance. The authors believe that "cloud and fog nuclei are composed of combustion products, which are the mixture of hygroscopic and nonhygroscopic substances." The apparatus used for the cloud chamber investigation is described and illustrated. (*Same item as 4.5-156*, May 1953, *MAB.*) *Subject Headings:* 1. Hygroscopic nuclei 2. Combustion nuclei 3. Nuclei instruments 4. Electron microscope studies.—*G.T.*

6I-51

551.574.1:551.578.4

Ôkita, Tochi-ichi (*Geoph. Inst., Tôhoku Univ.*), *Electron-microscope study of ice-crystal nuclei in the natural atmosphere*. *Tôhoku University. Science Reports, 5th Ser., Geophysics*, 4(2):78-81, Oct. 1952. 2 figs., 12 photos., 2 tables, 8 refs. Also in: *Meteorological Society of Japan, Journal*, 30(12):379-385, Dec. 1950. In Japanese; English summary. **MH-BH**—As a member of a research group of the Tohoku Electric Power Company, the author participated in experiments on artificial production of snow on Mt. Zaô in 1952. In this paper he reports on his technique for capturing ice crystals and examining them with an electron microscope. He describes observed properties of the condensation nuclei and presents data on their size distribution. Most of the ice crystal nuclei, the author finds, are soil particles. Photographs of nuclei under the electron microscope are presented. (*Same item as 5.10-177*, Oct. 1954, *MAB.*) *Subject Headings:* 1. Ice crystal nuclei 2. Soil nuclei 3. Nuclei size distribution 4. Electron microscope studies.—*G.T.*

6I-52

551.574

†Ooura, H. (*Inst. of Low Temp. Sci., Hokkaido Univ.*), *Condensation and sublimation-nuclei in Wilson chamber*. *Geophysical Magazine*, Tokyo, 23(4):329-340, May 1952. fig., 10 tables, 2 refs., 8 eqs. **MH-BH**—Using the equation of TURNBULL and FISHER, the development of which is presented, the author calculates theoretically the expansion ratio at which nuclei of water and ice are produced in a Wilson chamber with or without the presence of ions. From the results of calculations which show that at an expansion ratio of 1.27 an ice embryo forms without an activated electric charge, that at 1.31 an ice embryo forms with one positive electron and at 1.25 an embryo forms with one negative electron. The surface free energies of ice at various temperatures were calculated from the experimental values of C. R. POWELL, A. W. BREWER and H. P. PALMER and were used to calculate the activation of free energy necessary for an ice nucleus to grasp one molecule of water vapor; this energy is 1.0×10^{-12} erg/molecule. (*Same item as 4.8-170*, Aug. 1953, *MAB.*) *Subject Headings:* 1. Ice nuclei 2. Nuclei surface energies 3. Nuclei experiments.—*I.L.D.*

6I-53

551.574.1

Parkinson, Wilfred C. (*Obs. Nacional do Brasil, Rio de Janeiro*), Note on the concentration of condensation nuclei over the Western Atlantic. *Journal of Geophysical Research*, 57(2):314-315, June 1952. 7 refs. **MH-BH**—Observations with Aitken pocket dust counter on a voyage from New York to Rio de Janeiro gave mean of 676 nuclei/cc. (*Same item as 4.8-171, Aug. 1953, M.A.B.*) *Subject Headings: 1. Nuclei over oceans 2. Atlantic Ocean.—C.E.P.B.*

6I-54

551.574.1:551.508.91

Pollak, Leo Wenzel (*Dir., School of Cosmic Physics, Dublin*), A condensation nuclei counter with photographic recording. *Geofisica Pura e Applicata*, Milan, 22(1/2):75-83, Jan./March 1952. 10 figs., 7 refs. English and German summaries p. 75. **MH-BH**—An elaborate and improved combination visual and photographic nuclei counter is described and illustrated. The 24-square centimeter counting allows a much more rapid counting than was possible with the Aitken instrument. Further advantages are: 1) possibility of elimination of repeated sampling to get a good average, 2) leaks are prevented by special sealing arrangement and by vacuum tops, 3) windows can be electrically heated to remove condensation, 4) a magnetic stirrer and 2 detachable pumps are provided and a range of drop density possible from 1 drop per 24 mm² to 350,000 per cm³ (visual) or 3 million per cm³ (photographically). Aitken counter ranges from 55 to 140,000 per cm³. Records are reproduced. (*Same item as 3.11-68, Nov. 1952, M.A.B.*) *Subject Headings: 1. Nuclei visual counters 2. Nuclei photographic recorder.—M.R.*

6I-55

551.574.1:551.508.91

Pollak, Leo Wenzel and Murphy, T., Sampling of condensation nuclei by means of a mobile photoelectric counter. *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 5(1):100-109, 1952. 8 figs., 3 tables, 9 refs. English, German and French summaries p. 100-101. **DWB**—An improved photoelectric nuclei counter at the Dublin School of Cosmic Physics and equipment of a motor car as a mobile laboratory are described and the technique of observations during travel is outlined. Observations around Dublin and in 2 traverses of Ireland to W. coast are shown in tables and diagrams. Among the results were uniformity of nuclei distribution in Polar air away from contamination and great variability (100 to 206,000/cc in 45 min) in showery weather with wind from the sea on West Coast. High concentrations at low tide are attributed to drying foreshore. (*Same item as 3.11-182, Nov. 1952, M.A.B.*) *Subject Headings: 1. Nuclei geographical distribution 2. Nuclei in polar air 3. Photoelectric nuclei counter 4. Dublin, Ireland.—C.E.P.B.*

6I-56

551.574.1:551.508.91

Pound, Guy M., Kinetics of nucleation in atmospheric phase transitions. Carnegie Institute of Technology. Metals Research Laboratory, Contract AF 19(122)-185, (Research) Reports, No. 1 to 7, pub. July 1, 1950 to March 1, 1952. 10 figs., tables, plates, refs., eqs. **DWB**—This series of reports on experimental work done in the laboratory takes up many subjects important in the study of nucleation in the atmosphere, and presents a valuable source of information on recent developments in this field. The main lines of investigation were: Measurement of the critical supersaturation ratios required for ice-particle formation in the absence and presence of foreign nuclei; Construction of a new adiabatic expansion chamber and development of a method of eliminating any impurities in it; Test of critical supersaturation data with new chamber using oxygen and nitrogen as the carrier gas in the absence and in the presence of electric field; Investigation of nucleation of droplets and crystals from the vapor phase; Critical supersaturation data for the homogeneous nucleation of water droplets and ice crystals from the vapor phase in which nitrogen is the carrier gas; Construction of a new thermostat bath and refrigeration system for obtaining better temperature control; Studies of heterogeneous nucleation from sodium vapor; Measurement of supersaturation critical data for the homogeneous nucleation of water droplets and ice crystals from the vapor phase as a function of temperature have been made with the new low-temperature thermostat equipment. (For abstract on Reports, 5-7, see item 6F-96, June 1955, M.A.B.) *Subject Headings: 1. Nuclei experiments 2. Sodium nuclei 3. Adiabatic expansion chamber.—N.A.S.*

6I-57

551.574.1

†Pound, Guy M. (*Carnegie Inst. of Technology, Pittsburgh*), Liquid and crystal nucleations. *Industrial and Engineering Chemistry*, 44(6):1278-1283, June 1952. 10 figs., 22 refs., 17 eqs. **DLC**—For liquid nucleation from vapor, there is surprisingly good agreement of elementary rate theory with experiment. It is thought that nucleation experiments may be used to study the properties of small aggregates of molecules and to estimate interfacial free energies where one of the phases is solid. Progress in the study of the kinetics of crystalline nucleus formation in supercooled liquids has been hindered by the fact that it is difficult to prepare liquids that are free of minute solid impurities which may catalyze nucleation, and also that once a supercooled liquid has been seeded, crystallization by growth of the nucleus usually follows rapidly, thus ending the experiment as

soon as the first nucleus is formed. The solution of these difficulties recently has led to progress in the quantitative study of the kinetics of this type of nucleation. Developments in heterogeneous and homogeneous nucleation of condensed phases from the supersaturated vapor and in nucleation from supercooled liquids are reviewed. (*Same item as 4.7-144, July 1953, MAB.*) *Subject Headings:*

1. Crystalline nuclei 2. Nuclei formation 3. Nuclei experiments.—*Author's abstract.*

6I-58

551.574.1

Reiss, Howard (*Boston Univ.*). **Theory of droplet growth.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 13:40-50, May 1952. 5 figs., 10 refs. **DWB**—The author gives a theoretical analysis of physical properties of a condensation nucleus, of the rate of phase transition and of phase transition in a binary system. The effect of the introduction of various kinds of foreign nuclei is considered. (*Same item as 4.8-173, Aug. 1953, MAB.*) *Subject Headings:* 1. Nuclei physical properties 2. Drop growth 3. Nuclei theories.—*G.T.*

6I-59

551.574.1

†Reiss, Howard (*Celanese Corp. of America, Summit, N. J.*). **Theory of the liquid drop model.** *Industrial and Engineering Chemistry*, 44(6):1284-1288, June 1952. 3 figs., 28 refs., 35 eqs. **DLC**—The author reviews the "classical nucleation theory" introduced by VOLMER and FARKAS, developed by BECKER and DÖRING and presented in its most modern form by FRENKEL and ZELDOWICH. In this theory, condensation nuclei are regarded as small liquid incompressible spherical drops, the definition of whose free energy, together with the determination of equilibrium distribution, serves as a basis for calculation of the rate of nucleation. After pointing out some shortcomings of this approach, the author introduces his own "statistical theory" of nucleation based on "the statistical derivation of the equilibrium distribution of embryos." A configuration picture and a curve of the statistical distribution function are presented. (*Same item as 4.3-192, March 1953, MAB.*) *Subject Headings:* 1. Classical nucleation theory 2. Statistical nucleation theory 3. Liquid nuclei.—*G.T.*

6I-60

551.574.1:551.521

Reynolds, S. E.; Hume, William, Jr. and McWhirter, Max (*New Mexico, Inst. of Mining and Technology, Socorro*). **Effects of sunlight and ammonia on the action of silver-iodide particles as sublimation nuclei.** *American Meteorological Society, Bulletin*, 33(1):26-31, Jan. 1952. 4 figs., 4 refs., summary p. 26. **MH-BH**—Report on experimental determination of the behavior of AgI particles exposed to Mineralite ultraviolet radiation and to sunlight, with or without addition of ammonia. It was found that concentration of effective nuclei in AgI will noticeably decrease under exposure to sunlight or ultraviolet radiation. By adding ammonia the AgI nuclei become reactivated. Data obtained during the experiments are presented in graphs. It is pointed out that addition of ammonia before exposure to sunlight will decrease rather than increase the number of effective AgI nuclei. An explanation of this phenomenon is offered. (*Same item as 4.3-193, March 1953, MAB.*) *Subject Headings:* 1. Silver iodide nuclei 2. Sublimation nuclei 3. Nuclei and UV radiation 4. Nuclei and sunshine 5. Nuclei experiments.—*G.T.*

6I-61

551.574.1:551.508.91

Seely, Ben K., **Detection of micron and submicron chloride particles.** *New Mexico. Institute of Mining and Technology, Contract N70NR-405, Task I, Project NR-082-013, Technical Report*, No. 4-NR [1952]. 2 figs., 5 refs. Reprint from *Analytical Chemistry*, Wash., D. C., 24:576-579, March 1952. **DWB**—A method is described for detection of individual chloride particles in air masses or rain regardless of concentration. Micron and submicron chloride particles are collected by an air-borne impactor and revealed by a gelatine-glycerol film sensitized with mercurous fluosilicate dissolved in fluosilicic acid. Each particle or drop of chloride dissolves in the sensitizing agent and diffuses radially producing a halo which is easily identified with a microscope—either on the ground or in flight. The method was used on 30 flights (1948 to date) and daily counts have been made for 2 years at Socorro, New Mexico. Automatic counts are also made hourly. Air masses containing chlorides have been identified immediately in flight, and chloride particles found 1000 mi. from the sea. Limitations are discussed—mainly due to fading with time. *Subject Headings:* 1. Chloride nuclei 2. Nuclei counters 3. Nuclei and air masses 4. Socorro, New Mexico.—*M.R.*

6I-62

551.574.1:551.576.11

Squires, P. (*Univ. Grounds, Sydney*). **The growth of cloud drops by condensation.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 5(1):59-86, March 1952. 6 figs., 5 tables, 21 refs. **MH-BH**—It was found previously that clouds contain a narrower range of drop sizes than of condensation nuclei, as a result of supersaturation which increases from zero at base of cloud to a maximum not far above, so that a nucleus grows rapidly to a size at which the nucleus exerts little effect on the drop's growth due to falling velocity is formulated. Transfer of heat and water vapor, heat balance of a drop, equation of growth, growth in cloud under adiabatic assumption, character-

tics of condensation processes in a cloud, approximate value for supersaturation, relative magnitude of fog term which is neglected, growth of small droplets, growth of large droplets and finally definition of m , the measure of nucleus size of small nuclei are discussed in quantitative terms. (*Same item as 2-187, Feb. 1953, MAB.*) *Subject Headings:* 1. Nuclei size 2. Nuclei growth.—M.R.

6I-63

551.510.41:551.574.1

Vonnegut, Bernard and Neubauer, Raymond L., Counting sodium-containing particles in the atmosphere by their spectral emission in a hydrogen flame. Also: Vonnegut, B., Effect of halogens in the production of condensation nuclei by a heated platinum wire. General Electric Research Laboratory, Project Cirrus, Occasional Report, No. 38/39; Contract DA-36-039-se-15345, Occasional Report, No. 9/10, Oct. 1, 1952. 18+3 p. 9 figs., refs. Also in: *American Meteorological Society, Bulletin*, 34(4):163-169, April 1953. DWB—Sketch and description of apparatus given and experimental data presented in graphical form for a period of 7 months. No significant relation to other meteorological variables shown. Particles counted originate probably not only from ocean spray, but also from dust storms and human activity. Record of high counts caused by traffic over dusty road show definite maxima about 7 a.m. and 4 p.m. (*Same item as 5.5-83, May 1954, MAB.*) *Subject Headings:* 1. Aerosol counters 2. Sodium nuclei 3. Dust nuclei.—A.A.

6I-64

551.574.1

Woodcock, Alfred H., Atmospheric salt particles and raindrops. *Journal of Meteorology*, Boston, 9(3):200-212, June 1952. 16 figs., 7 tables, 31 refs. MH-BH, DWB. Also issued as: Woods Hole Oceanographic Institution, Contract N6onr-27702(NR-082-021), Technical Report, No. 14, Sept. 1951. 28 p. photos., diagrs., graphs, bibliog. DWB—Atmospheric sea salt data are presented in the form of distribution curves which show the number of sea salt particles (of a given weight range) sampled at different altitudes plotted against the weight. Computations show that "in the process of growth the droplets containing each salt particle grow to raindrop size through coalescence with much more numerous and relatively non-saline cloud droplets. The numbers of droplet in cumulus clouds over the sea are compared to the numbers of condensation nuclei in the sub-cloud layer and to the number of larger sea-salt particles." A method of sampling the large sparsely-distributed salt particles in the atmosphere is described briefly. (*Same item as 3.11-184, Nov. 1952, MAB.*) *Subject Headings:* 1. Nuclei vertical distribution 2. Salt nuclei 3. Nuclei and clouds.—M. P. Kramer.

1953

6I-65

551.574.1

Aliverti, Giuseppina and Lovera, Giuseppe, Sui nuclei de condensazione di origine marittima. [Condensation nuclei of marine origin.] *Geofisica e Meteorologia*, Genoa, 1(2/3):33-35, March/June 1953. 6 figs. MH-BH—A general discussion of old and new methods of measuring condensation nuclei: namely, those of OWENS, AITKEN, ZEISS, WILSON and, finally, DESSENS, KÖHLER and CHAPMAN. The latter methods allow the accurate measurement of the actual number and size of NaCl particles or the number of ions in sea salt laden air. (*Same item as 5.5-161, May 1954, MAB.*) *Subject Headings:* 1. Salt nuclei 2. Nuclei size measurement methods 3. Ion counting method.—M.R.

6I-66

551.574.1:551.508.91

†Aliverti, Giuseppina (Naples), Tecniche e risultati di recenti studi su l'aerosol atmosferico. [Techniques and results of recent studies of the atmospheric aerosol.] *Rivista di Meteorologia e Aeronautica*, Rome, 13(4):3-8, Oct./Dec. 1953. 9 refs. French, Italian, German and English summaries p. 3. MH-BH—A long review of the results of recent research on condensation nuclei, especially methods of counting particle size distribution. The counters developed by AITKEN in early years, and the methods of JUNGE, WOODCOCK, CAUER, ZANON, CROZIER, and SEELY, DESSENS and FACY for various kinds of nuclei (NaCl and Cl, SO₄, NH₄⁺ and NO₃⁻ ions) are compared critically. Condensation and freezing nuclei are distinguished. *Subject Headings:* 1. Literature reviews 2. Nuclei counters 3. Ammonium ions 4. Salt nuclei 5. Nuclei size.—M.R.

6I-67

551.574.1:551.575.1:551.591.1

Best, A. C., Condensation nuclei and the development of radiation fog. *Royal Meteorological Society, Quarterly Journal*, 79(339):112-120, Jan. 1953. 4 tables, 8 refs., 19 eqs. DWB—Expressions are derived for growth of liquid water droplets on condensation nuclei (sea salt) as humidity rises from 80-100%, and tables calculated for rate of growth of drops, and of liquid water content W as a function of size distribution of nuclei and relative humidity. Size distribution has little effect but at saturation W varies as $\sqrt{\text{mean mass of nuclei}}$. Near saturation a very small variation of humidity has a very large effect on W . Expressions are developed for drop size distribution (R.H. 100%). Visibility in water fog is briefly considered. (*See also 3.5-275, May 1952; same item as*

4.6-162, June 1953, *MAB.*) *Subject Headings:* 1. Sea salt nuclei 2. Nuclei and humidity 3. Nuclei size distribution.—*C.E.P.B.*

6I-68

551.508.91:551.574.1

Bider, M. and Verzár, F., *Kontinuierliche Messung atmosphärischer Kondensationskerne (Vorläufige Ergebnisse mit dem registrierenden Kernzähler in Basel.)* [Continuous measurement of atmospheric condensation nuclei. (Preliminary results with the recording nuclei counter in Basel.)] *Geofisica Pura e Applicata*, Milan, 26:127-140, 1953. 10 figs., 3 tables, 14 refs. German and English summaries p. 127. **DWB**—Hourly averages of condensation nuclei count at Basel taken from continuous records made with a Verzár photoelectric counter, using the POLLAK (1946-1952) principle, during Jan. March 1953 are analyzed to show relation to time of day (maximum at 10 h-16 h), wind speed (slight decrease with increase in wind speed), wind direction (max. from NNW-ENE, min. from SW), cloudiness (most on clear days), relative humidity (decrease with increase in R.H.), visibility (relation obscure) and air mass types (max. in mT, min. in mP). (*Same item as* 5.11-47, Nov. 1954, *MAB.*) *Subject Headings:* 1. Nuclei diurnal variations 2. Nuclei and wind 3. Nuclei and clouds 4. Nuclei and visibility 5. Nuclei and air masses 6. Verzár photoelectric nuclei counter 7. Basel, Switzerland.—*M.R.*

6I-69

551.574.1

Bowen, E. G., The influence of meteoric dust on rainfall. *Australian Journal of Physics* Melbourne, 6(4):490-497, 1953. 5 figs., 2 tables, 6 refs. **DLC, MH-BH**—A theory of the dependence of rainfall on meteoric dust, which accompanies meteors and provides rain-forming nuclei when it falls into cloud systems in the lower atmosphere, is presented and illustrated by comparison with rainfall data in Australia and with the dates of meteor streams nearest in time to the rainfall peaks. Data from Geminids, Ursids and Quadrantids are examined and author concludes that the rainfall peaks tend to follow the meteor showers after an interval of 30 days. Relationships between meteoric dust and noctilucent clouds are analyzed and it is concluded that these clouds have their origin in meteoric dust, but it is not yet clear whether the material which becomes visible is the dust itself or whether it acts as a nucleus for the formation of ice crystals or for the condensation of water vapor. *Subject Headings:* 1. Meteoric nuclei 2. Nuclei and rain 3. Nuclei and noctilucent clouds.—*N.A.S.*

6I-70

551.574.1

Dufour, Louis and Defay, Raymond, Sur la formation des germes de condensation et de solidification autour d'un noyau solide insoluble. [Formation of condensation nuclei and solidification around an insoluble solid nucleus.] *Tellus*, Stockholm, 5(3):293-301, Aug. 1953. 4 figs., 2 tables, 11 refs., 41 eqs. In French; English summary p. 293. **MH-BH**—Solid insoluble nuclei help the formation of water or ice inasmuch as the adhesion-coefficient of water or ice on the solid is positive. If this coefficient is greater than 1 and if the solid nucleus is great enough this effect may be sufficient to render null the free energy of formation of germs and to provoke the condensation or the solidification without germ. These effects can be calculated *a priori*, assuming a certain degree of saturation of the atmospheric water vapor provided the suitable adhesion-coefficients be known. (*Same item as* 5.7-137, July 1954, *MAB.*) *Subject Headings:* 1. Insoluble nuclei 2. Nuclei formation theory.—*Authors' abstract.*

6I-71

551.574.1:551.508.9

Fedele, Diego and Vittori Antisari, Ottavio (*Obs. di Monte Cimone*), Determinazione delle particelle di cloruro nell'atmosfera e metodi di misura. [Determination of chloride particles in the atmosphere and methods of measurement.] *Rivista di Meteorologia Aeronautica*, Rome, 13(4):9-13, Oct.-Dec. 1953. 3 figs., 12 refs. Italian, French, German and English summaries p. 9. **DLC**—Three methods of determining the concentration of chemical nuclei in the atmosphere are reviewed: 1) electron microscope examination (20,000/1 enlargement); 2) spectroscopic analysis, especially of sodium salts, using photoelectric counters; 3) direct chemical methods such as LIESEGANG'S (1896) gelatin reaction, with modifications such as CROZIER, SEELY, and WHEELER (see 4.2-84 Feb. 1953, *MAB*) employed, which has been adapted to use at Monte Cimone Observatory (2163 m) in counting particles present in different air masses. The impact method and an electrostatic precipitation method were both tried for 75 min and are compared. Conclusion is that the LIESEGANG method is sufficiently reliable for air mass particle analysis (chlorides). *Subject Headings:* 1. Nuclei counting methods 2. Chloride nuclei 3. Nuclei and air masses 4. Monte Cimone Observatory Italy.—*M.R.*

6I-72

551.574.1:551.508.9

Fedele, Diego and Vittori Antisari, Ottavio, Rivelazione delle particelle atmosferiche di cloruro con la reazione di Liesegang sensibilizzata fotochimicamente. [Detection of atmospheric

chloride particles with the Liesegang reaction sensitized photochemically.] *Rivista di Meteorologia aeronautica*, Rome, 13(4):14-18, Oct./Dec. 1953. 6 figs., refs. Italian, French, German and English summaries p. 14. **DLC**—Describes improved techniques for detecting and counting chloride particles to 10^{-15} or 10^{-16} g weight as employed at Monte Cimone Observatory, Italy. A number of photographs of emulsified plates with annular rings (LIESEGANG) clearly visible are reproduced and described. An average no. of chloride nuclei of 10^7 to $10^8/\text{m}^3$ was found at 2163 m elevation. The process described involves exposure of the gelatin with AgNO_3 for 10 min to sunlight, allowing continued reduction of AgNO_3 to AgCl . Further sensitivity is produced by electrostatic precipitation, allowing particles of any size to be counted. *Subject Headings*: 1. Chloride nuclei 2. Nuclei size 3. Liesegang nuclei counting method 4. Monte Cimone Observatory, Italy.—*M.R.*

6I-73

551.574.1(54)

Fournier D'Albe, E. M. and Lateef, A. M. A., Preliminary note on the large hygroscopic particles suspended in the atmosphere. *Puy-de-Dôme. Observatoire Bulletin*, Ser. 2, No. 1:1-11, Jan. 1953. 2 figs., 2 tables, 2 eqs. **MH-BH**—Some of the results of six months of measurement of the natural hygroscopic particle content of the atmosphere carried out at five meteorological stations in West Pakistan in 1952. Samples of hygroscopic nuclei were taken with a cascade impactor; the method of sampling is described in detail. Examples of differing particle concentration and size distribution, illustrated graphically and tabularly indicate a greater concentration in maritime than in continental air, that the main source of hygroscopic particles is the coast rather than the open sea, that size distribution shows little variation from week to week and no appreciable diurnal variation, but that total concentration shows considerable diurnal and secular variations. *Subject Headings*: 1. Nuclei sampling method 2. Hygroscopic nuclei 3. Nuclei sources 4. Nuclei diurnal variations 5. Nuclei and air masses 6. West Pakistan.—*I.L.D.*

6I-74

551.574.1

Frenkel', I. A. I., O fotokhimicheskom mekhanizme vozniknoveniia iader kondensatsii v zemnoi atmosfere. [Photochemical mechanism in the formation of condensation nuclei in the earth's atmosphere.] *Akademiia Nauk SSSR, Izvestiia*, Ser. Geofiz., No. 2:191-192, 1953. ref. **DLC**—The hypothesis is proposed that condensation nuclei of water vapor in the atmosphere are produced by the condensation in the upper atmospheric layer by the action of ultraviolet light from the sun. (Same item as 5.3-244, March 1954, *MAB*.) *Subject Headings*: 1. Nuclei sources 2. Nuclei and ultraviolet radiation 3. Nuclei formation theory.—*I.L.D.*

6I-75

551.574.1

Frisch, H. L. and Collins, F. C., Theoretical investigation of the growth of aerosol particles by diffusion. Brooklyn. Polytechnic Institute. Dept. of Chemistry, Contract AF 19(122)-412, Scientific Report, No. 2. [1953?] 14 p. 11 refs., 40 eqs. Mimeo. Also: Scientific Report, No. 3, [1953?] 9 p. table, foot-refs., 20 eqs. **DWB**—1) The growth rate and radius of an aerosol particle in a turbulent supersaturated fluid is calculated on the basis of a simple "stagnant film" model, in the presence of time-dependent, homogeneously distributed sources in the diffusion field. The limiting growth law leads to a three-halves power dependence of the radius upon the time. The collapse of the supersaturation due to competition for molecules of the diffusing species among an initially monodisperse, homogeneous and random distribution of aerosol particles leads to an asymptotic in time final limiting critical radius. The critical radius attained is equal to the corresponding critical radius of an aerosol particle growing in fluid at rest in an infinite volume. The distribution of initially monodisperse aerosol particles remains monodisperse throughout the growth process. The application of the theory to the growth of water droplets in a turbulent cloud is indicated. 2) The effect of the velocity of a freely falling aerosol droplet upon its diffusion-controlled growth rate is evaluated. It is found that the velocity of the droplet in the diffusion field does not significantly accelerate its growth unless the radius of the particle exceeds 10^{-3} cm. Thus it appears that the effect of the gravitation fall of aerosol droplets during their growth from the supersaturated vapor may be safely neglected. (Same item as 5.10-175, Oct. 1954, *MAB*.) *Subject Headings*: 1. Nuclei growth 2. Nuclei size.—*Authors' abstract.*

6I-76

551.510.42:551.510.52

*Junge, Christian, Die Rolle der Aerosole und der gasförmigen Beimengungen der Luft im Spurenstoffhaushalt der Troposphäre. [The role of aerosols and gaseous impurities of the atmosphere in the chemical balance of the troposphere.] *Tellus*, Stockholm, 5(1):1-26, Feb. 1953. 8 figs., 9 tables, bibliog. p. 26. **MH-BH**—The size distribution curves for aerosols in the atmosphere at Frankfurt a.M. and Feldberg/Ts (800 m) are extended to the ranges 0.005 and 0.1μ radius on the basis of ion measurements at Frankfurt and Zugspitze, respectively. The maximum frequency occurs at about 0.88μ . From these measurements the total volume of impurities in a given volume of air near the ground is calculated according to 3 categories: Aitken, large and giant nuclei, re-

spectively. The relative importance of the Aitken particles ($.005$ to $.1\mu$) is small compared with that of the 0.1 to 1μ (large) or the 1.0 to 20μ (giant) particles (the latter 2 size distributions contribute about equal volumes). Finally, an extensive summary is given of recent results of the author W. JACOBI and W. LIPPERT (see item 4.4-185, April 1953, MAB) on chemical analysis of natural aerosols by determining the dispersion of electrons. Smaller nuclei ($<1\mu$) are mostly ammonium sulfate, whereas NaCl nuclei are generally $>1\mu$. Electron microscope determinations and, finally, results of chemical analysis of rainwater are discussed and tabulated along with results of other authors in various parts of the world. (Same item as 5.1-105, Jan. 1954, MAB.) *Subject Headings:* 1. Aerosol analysis 2. Nuclei size 3. Ion count 4. Large nuclei 5. Giant nuclei 6. Ammonium sulfate nuclei 7. Salt nuclei 8. Frankfurt a.M., Germany.—M.R.

6I-77

551.574.1:535.3

Kamiyama, K. and Moriguchi, M., **Infra-red spectrometry of condensation nuclei.** *Papers in Meteorology and Geophysics*, Tokyo, 3(4):307-312, March 1953. 2 figs., 5 refs. MH-BH—Near infra-red rays (1.307 and 1.216μ) which have no connection with the absorption band of water vapor were applied to fog produced with adiabatic expansion in an expansion chamber. From the ratio of the light transmission of each wave length the sizes of fog particles were estimated. The effect of AgI and NaCl nucleation on light attenuation and the effect of ultraviolet irradiation of AgI and NaCl nucleation are investigated. (Same item as 5.6-201, June 1954, MAB.) *Subject Headings:* 1. Silver iodide nuclei 2. Salt nuclei 3. Nuclei and ultraviolet radiation.—Authors' abstract.

6I-78

551.574

†Khrgian, A. Kh., **Fizika atmosfery.** [Physics of the atmosphere.] Moscow, 1953. 456 p. figs., tables, refs., eqs. DLC—On p. 241-247 is found a concise but very explicit treatment of the knowledge on condensation nuclei. The theory of drop formation over a nucleus as well as in the absence of nuclei is presented by equations. Vertical distribution of condensation nuclei from 0 to 4000 m is given in Table 85. Observations made on Elbrus have shown that over a clean snow surface nuclei count was considerably higher than that in the free atmosphere. According to I. I. GAI'VORONSKIĭ and V. I. ZAITSEV the content of nuclei increases considerably under inversion layers, on the other hand some authors have proved that inside a cloud the number of free nuclei diminishes and the number of fading nuclei is many times higher than the number of drops observed in the same volume. Diurnal variations, distribution of sizes obtained from observations with an electron microscope and sublimation nuclei properties are also treated. (Same item as 5.7-7, July 1954, MAB.) *Subject Headings:* 1. Nuclei theories 2. Nuclei over snow surface 3. Nuclei vertical distribution 4. Nuclei and inversions 5. Nuclei and clouds 6. Nuclei diurnal variations 7. Nuclei size 8. Sublimation nuclei.—N.A.S.

6I-79

551.574.1:551.46

*Köhler, Hilding and Båth, Markus, **Quantitative chemical analysis of condensation nuclei from sea water.** *Vetenskaps-Societeten i Uppsala, Nova Acta*, 4th Ser., 15(7), 1953. 24 p. 7 figs., tables, refs. p. 24. Also as: *Uppsala. Universitet. Meteorologiska Institutionen, Meddelande* No. 31. DWB—Sea water was artificially evaporated in a laboratory in order to determine chlorinity, magnesium and sodium in condensation nuclei. Experimental arrangement and chemical methods used are described. Data of the chemical analysis of the nuclei are given in detail. Mean Mg/Cl and Na/Cl ratios are somewhat smaller in droplets than in sea water, the deviation for Na/Cl being significant. Frequency distributions for Mg/Cl ratio are shown. (Same item as 5.6-202, June 1954, MAB.) *Subject Headings:* 1. Sea salt nuclei 2. Magnesium nuclei 3. Chloride nuclei.—A.A.

6I-80

551.574.1:551.578.4

McDonald, James E., **Homogeneous nucleation of supercooled water drops.** *Journal of Meteorology*, 10(6):416-433, Dec. 1953. 3 figs., 3 tables, 43 refs., 10 eqs. MH-BH—This lengthy paper examines the theory of nucleation. Previous efforts to explain the observed rapid crystallization at -40°C are examined critically and numerous significant errors are pointed out. The theoretical nucleation rate is very sensitive to the numerical value adopted for the specific free energy of a water-ice interface, but the difficulties of estimating this are found to be very great, especially the direct calculation of the distortion energy of ice. After a crude correction for this, a theoretical temperature of -26°C is found for the spontaneous nucleation of drops of 10μ radius. This is so much nearer the observed -40°C than are other estimates that it is considered to strengthen the belief that this transition is due to spontaneous nucleation. (Same item as 5.6-204, June 1954, MAB.) *Subject Heading:* 1. Nucleation theory.—C.E.P.B.

6I-81

551.576.11:551.574

†Mason, B. J., **Progress in cloud physics research: a progress report on recent investigation at Imperial College, London.** *Archiv für Meteorologie, Geophysik und Bioklimatologie*, Ser. I

(1):1-52, 1953. 26 figs. 6 tables, 52 refs., 16 eqs. English, German and French summaries. 1-2. **MH-BH**—This valuable report collects 4 years of research on the physical processes in clouds which culminate in release of precipitation. It deals first with spontaneous nucleation by collision of vapor molecules. Measurements of condensation nuclei over the N. Atlantic are tabulated according to cloud types, large salt nuclei and their contribution to opacity, and origin of nuclei. Sec. 4 covers nucleation of supercooled water, initiation of ice phase, and freezing of supercooled drops. The expansion chamber experiments of FINDEISEN and SCHULZ are reexamined, freezing temperatures of solutions of electrolytes and chemical seeding of supercooled clouds are discussed. (*Same item as 5.2-5, Feb. 1954, MAB.*) *Subject Headings:* 1. Nuclei sources 2. Nuclei and clouds 3. Nuclei and visibility 4. Large nuclei 5. Salt nuclei 6. Cloud seeding 7. North Atlantic Ocean.—*C.E.P.B.*

6I-82

551.574.1

†Miller, Lewis E., **Sodium in the upper atmosphere.** *U. S. Air Force, Cambridge Research Center. Air Force Surveys in Geophysics*, No. 43, June 1953. 94 p. 3 figs., 4 tables, eqs. **DLC, DWB**—Extensive summary and evaluation of important topics on atmospheric sodium. Literature on the occurrence, vertical distribution and abundance of sodium in the upper atmosphere has been surveyed. (*Same item as 5.9-7, Sept. 1954, MAB.*) *Subject Heading:* 1. Sodium nuclei.—*N.A.S.*

6I-83

551.574.1:551.508.91

Moore, D. J., **The reliability of nucleus concentrations as measured by an Aitken counter.** *American Meteorological Society, Bulletin*, 34(9):410-412, Nov. 1953. 2 figs., table, ref. Hosler, C. L., **Reply.** *Ibid.*, 35(3):133, March 1954. **MH-BH**—HOSLER, BURKHART and NEUBERGER found that the number of nuclei deduced from electron microscope examinations of a collodion film exposed on the stage of an Aitken counter gave concentrations up to five times as large as those observed by the normal visual method. They attributed the discrepancy to sedimentation of nuclei during the interval between sampling and expansion and to evaporation of drops before they reached the stage. These effects have been examined by comparing the visual counts with the number of raters on magnesium oxide coated surfaces exposed on the stage of the counter. It appears that sedimentation leads to losses of only 10 to 15% of the nucleus population if the standard instructions for the use of the counter are followed. The high counts observed by HOSLER and others with the electron microscope are attributed to nuclei falling on the stage before and during the cleaning process which precedes admission of the sample. (*Same item as 5.9-219, Sept. 1954, MAB.*) *Subject Headings:* 1. Aitken nuclei counter 2. Electron microscope studies 3. High nuclei count. I. Hosler, C. L.—*Author's abstract.*

6I-84

551.574.1:551.508.91

Nolan, P. J. and Kenny, P. J., **Anomalous loss of condensation nuclei in rubber tubing.** *Journal of Atmospheric and Terrestrial Physics*, 3(4):181-185, May 1953. 13 refs., 4 eqs. **DWB**—Various formulas for diffusion loss of particles passing through narrow tubes or channels are collected. Loss of nuclei in a short length of rubber tubing, about 10% was much larger than given by these formulas. Loss was measured under different conditions and remedial measures described. (*Same item as 5.1-25, Jan. 1954, MAB.*) *Subject Heading:* 1. Nuclei counters.—*C.E.P.B.*

6I-85

551.574.1:551.508.91

†Nolan, P. J. and MacCormaic, P. S., **Nuclei produced by disruptive discharge at a water surface.** *Dublin. Institute for Advanced Studies. School of Cosmic Physics, Geophysical Bulletin*, No. 7, July 1953. 19 p. 6 figs., 14 refs. **DWB**—Extremely small condensation nuclei are produced by electric discharge at a water surface. The nuclei are discharged and consequently can play no part in the drop charging process of WILSON's theory of thunderstorms. The failure of previous observers to detect the discharge nuclei is ascribed to the low effective expansion ratio of the Aitken counter. In measuring the size and the supersaturation required for condensation on discharge nuclei it is shown that there is a vapor pressure deficit of between 10% and 15%. Similar measurements indicate that in the case of atmospheric condensation nuclei the vapor pressure deficit is about 5%. The Wilson ion and cloud expansion ratios are determined by means of the photoelectric nuclei counter. The results show that the expansion of the counter is truly adiabatic. (*Same item as F-268, June 1955, MAB.*) *Subject Headings:* 1. Small nuclei 2. Artificial nuclei production 3. Photoelectric nuclei counter.—*Authors' abstract.*

6I-86

551.594.13(261)

Parkinson, W. D. and Weller, R. I. (*Fordham Univ., N. Y.*), **Atmospheric electric elements over the ocean.** *Journal of Geophysical Research*, 58(2):270-272, June 1953. figs., eqs. **DWB**—Measurements of positive conductivity, nuclei count and sea and rain water radioactivity were made over the North Atlantic Ocean from a ship plying between New York and Liverpool and

return. Bad weather prevented conductivity records on eastbound trip. Good records were obtained for 6 days on westbound trip. Mean positive conductivity excluding foggy periods was 1.22×10^{-4} esu. and mean nucleus count 844/cm³ westbound and 449 eastbound. A continuous recording Gerdien aspirator was used for conductivity and an Aitken pocket dust counter for nucleus count. β content of rain was high up to 100 mi from shore but very low over deep ocean (5% of that over dry land) and none in sea water. Ionization over the ocean is thought solely due to cosmic radiation. (Same item as 5.8-274, Aug. 1954, MAB.) **Subject Headings:** 1. Nuclei and atmospheric conductivity 2. Nuclei count 3. North Atlantic.—M.R.

6I-87

551.574.

*Schiff, Daphne; Schiff, H. I. and Gendron, P. R., **The use of a diffusion cloud chamber to characterize condensation nuclei.** Montreal. Univ. Dept. of Chemistry, Contract AF 19(122) 380, Scientific Report, No. 1, Nov. 15, 1953. Reprint from *Canadian Journal of Chemistry*, 31:1108-1117, Nov. 1953. 5 figs., 2 tables, 6 refs. **DWB**—The original Langsdorf diffusion cloud chamber has been modified so that the temperature gradient obtained can be calculated from a diffusion equation. The effectiveness of various inorganic nuclei in causing condensation in this supersaturated vapor has been studied. **Subject Headings:** 1. Nuclei experiments 2. Nuclei effectiveness —Authors' abstract.

6I-88

551.574.1:551.509.6

Sciarrà Mortola, Luisa, **La microfisica delle nubi ed il controllo artificiale delle precipitazioni** [Microphysics of clouds and artificial control of precipitation.] *Geofisica e Meteorologia*, Genova 1(1):5-8, Jan./Feb. 1953. fig. **DWB**—Genesis and nature of condensation nuclei, their size and the role they play in natural and artificial precipitation processes are theoretically discussed using data and conclusions of other authors like H. ISRAËL, H. KÖHLER, W. FINDEISEN, BOWEN, etc. A very instructive diagram shows schematic distribution of masses and sizes of atmospheric aerosol particles classified into several groups of nuclei and ions. (Same item as 4.9-161, Sept. 1953, MAB.) **Subject Headings:** 1. Nuclei theories 2. Nuclei sources 3. Nuclei mass 4. Nuclei size distribution 5. Ion size distribution.—N.A.S.

6I-89

551.574.1:551.508.9

Soulage, Guy, **Une cuve frigorifique pour l'étude des cristaux de glace induits artificiellement dans un nuage surfondu.** [Cold chamber for the study of ice crystals artificially induced in supercooled cloud.] *Puy-de-Dôme. Observatoire, Bulletin, Ser. 2*, No. 4:81-90, Oct. 1953. 3 figs., 8 refs. **DWB**—A cold chamber is described and illustrated, in which the cooling power is supplied by a melting eutectic (low melting point) mixture. This technique permits exact temperature control. An experiment is described in detail, involving use of the apparatus for counting ice forming nuclei produced by an AgI smoke generator. (Same item as 6F-279, June 1955, MAB.) **Subject Headings:** 1. Artificial nuclei production 2. Nuclei instruments 3. Silver iodide nuclei —G.T.

6I-90

551.574.

Werle, D. K., **The formation of metallic aerosols.** *Armour Research Foundation*, Chicago. Contract AF 19(122)-472, Project C 022, Scientific Report, No. 17, Sept. 23, 1953. 30 p. 31 figs. **MH-BH**—Metallic aerosols have been made by the use of (1) a nichrome resistance furnace (1000°C), (2) a graphite resistance furnace (2200°C), (3) a tungsten filament (3000°C), and (4) exploding wires (over 5000°C) in a laboratory investigation of metal aerosol formation. Particle size was found to be very dependent on the kind and amount of nuclei present. Cadmium vapor condenses readily on silver iodide nuclei and results in near monodisperse aerosols at high nuclei concentration; at low nuclei concentrations, the aerosol particles were larger and fewer in number. NaCl appears to be comparatively ineffective as nucleating agent for cadmium. Small amounts of oxygen and water vapor (1-3%) present during the formation of cadmium and zinc aerosols appear to hinder the growth of large particles, especially in the case of zinc; the greater the tendency to oxidize, the smaller was the resulting particle size. A similar result was observed with metals that tend to react with nitrogen, i.e. magnesium and aluminum. The largest particles resulted when the vapor concentration was high and consisted of a metal not easily oxidized such as cadmium or copper. Aerosols made by exploding wires electrically resulted in dense, highly agglomerated aerosols. Nichrome, silver, and copper apparently produce the largest particles (in air) of the metals tested. Metals such as tungsten, iron, and aluminum when exploded in air result in a fine, fluffy, agglomerated aerosol. **Subject Headings:** 1. Silver iodide nuclei 2. Metallic aerosols 3. Nuclei experiments.—Author's abstract.

6I-91

551.574.

Woodcock, Alfred H., **Salt nuclei in marine air as a function of altitude and wind force.** *Woods Hole Oceanographic Institution, Contract Nonr-798(00), Technical Report, No. 3*, Dec. 1953.

p. 8 figs., 12 refs. Also in: *Journal of Meteorology*, 10(5):362-371, Oct. 1953. DWB—Shows that marine atmospheres contain widely varying amounts of large sea-salt nuclei, the quantity depending largely upon altitude and wind speed. It is expected that this knowledge will prove useful in studies of rain formation over the sea, oceanic islands, and perhaps over continental land masses as well. Data show changes in numbers and sizes of sea-salt particles in marine air over the sea as altitude, position, and time of sampling are varied. Large changes with time in the amount of air-borne salt near cloud base are related to changes in wind force at the sea surface. Greater wind force is associated with increasing amounts of salt, especially at the large end of the particle weight range. Suggested that bursting air bubbles in "white caps" on the open sea are a major source of the salt nuclei. Under similar wind conditions, variations in particle number and size at various altitudes within the lower atmosphere are similar in Hawaii, Florida and South Australia. (Same item as 5A-197, Jan. 1954, MAB.) *Subject Headings: 1. Salt nuclei 2. Nuclei in marine air 3. Nuclei vertical distribution 4. Nuclei and wind.—Author's abstract.*

6I-92

551.574.1:551.510.42

†Würfel, H., Über den Tagesgang des Kerngehalts der Luft in Berlin-Buch. Ein Beitrag zur Lufthygiene von Grosstadtrandgebieten. [On the diurnal variation of the nuclei content of air in Berlin-Buch. A contribution to air hygiene of margins of large towns.] *Angewandte Meteorologie*, 12(12):360-372, Dec. 1953. 9 figs., 24 refs. DLC—For a point on the northern edge of Berlin hourly counts on nuclei 7-21 h are studied. Maximum about 11 h followed by a decrease due to vertical exchange. Winds from Berlin have many more nuclei and more variable frequency distribution than winds from open country. Monthly variations are related to variations of wind direction. Typical diurnal variations for selected days are shown and relations to weather type are summarized. (Same item as 5.7-139, July 1954, MAB.) *Subject Headings: 1. Nuclei diurnal variations 2. Berlin, Germany.—C.E.P.B.*

6I-93

551.574.1:551.508.91

†Yamamoto, Gi-ichi and Ohtake, Takeshi (*Geoph. Inst., Tohoku Univ.*), Electron microscope study of cloud and fog nuclei. *Tohoku Univ. Science Reports, 5th Ser., Geophysics*, 5(3):141-159, Dec. 1953. 37 figs., 13 refs. Also as: *Meteorological Society of Japan, Journal, Ser. 2*, 32(7/8):42-248, July/Aug. 1954. In Japanese. Also as: *Committee for Rain-making in Japan, Tokyo, Report of Rain-making in Japan*, 1:141-159, 1954. MH-BH—Specimen changes due to electron bombardment in the electron microscope were investigated on numerous artificially produced nuclei. It was noticed that nuclei of different substances show the specimen changes characteristic to the respective substances. With use of these results, the nature of fog nuclei captured in Sendai and of cloud nuclei on Mt. Zaō was investigated. Several statistical results concerning the nature and size of fog and cloud nuclei are described. *Subject Headings: 1. Nuclei experiments 2. Nuclei size 3. Artificial nuclei 4. Electron microscope studies 5. Mt. Zaō, Japan.—Authors' abstract.*

6I-94

551.574.1:551.586:615.8

Zenker, H., Messungen des Kerngehaltes der Luft in Heringsdorf/Usedom. Ein Beitrag zur lufthygienischen Überprüfung der Kur- und Erholungsgebiete. [Measurements of nuclei content of the air in Heringsdorf. A contribution to the examination of atmospheric hygiene of health and convalescence resorts.] *Angewandte Meteorologie*, 1(10):304-313, June 1953. 8 figs., 10 tables, 14 refs. MH-BH—Heringsdorf is on NE coast of island of Usedom in the Baltic (salinity ‰). Nuclei counts were made on a pier, the beach, a part in the town 250 m inland, and a pine-wood. These show characteristic differences. Histograms and nuclei wind roses show numbers of nuclei in winds from different directions and at different seasons; on the beach and pier winds off the sea are much the cleanest and healthiest; such winds are most frequent March-June. The wood also has cleaner air than the town. (Same item as 5.1-219, Jan. 1954, MAB.) *Subject Headings: 1. Nuclei wind roses 2. Nuclei geographical distribution 3. Medical climatology 4. Usedom, Baltic Coast, Germany.—C.E.P.B.*

6I-95

551.574.1:551.553:551.591.3

Zenker, H., Über Beziehungen zwischen Kernzahlen und Windstärke, Sicht und Feuchtigkeit an der deutschen Ostseeküste. [Relationship between the number of nuclei and wind speed, visibility and humidity on the German coast of the Baltic.] *Zeitschrift für Meteorologie*, 7(7):209-215, July 1953. 3 figs., table, 11 refs. MH-BH—On the basis of extensive nuclei counts made at Heringsdorf/Usedom, the author examined the relationship between the number of nuclei and 1) wind intensity, 2) visibility, 3) relative humidity for sea breezes, pure sea breezes, pseudo sea breezes and land breezes with local nuclei production and the relationship between nuclei count and precipitation. The mean values of nuclei counts diminished with increasing wind velocity, for all wind types. The relationship between nuclei count and relative humidity is very slight; the nuclei count increased with low relative humidity and the highest counts were during moderate relative humidity.

The nuclei content of the atmosphere decreases with precipitation. (Same item as 5.7-141, July 1954, MAB.) *Subject Headings:* 1. Nuclei and humidity 2. Nuclei and rain 3. Nuclei and wind 4. Usedom, Baltic Coast, Germany.—I.L.D.

1954

6I-96

551.574.1:551.515.8:551.508.91

Ackermann, Paul (*Met. Office, Payerne, Switzerland*), **Kondensationskernzählung in Payerne** 1953. [Recording of condensation nuclei in Payerne, 1953.] *Geofisica Pura e Applicata*, Milan, 29:168-177, Sept./Dec. 1954. 8 figs., table, 7 refs. German, English and French summaries p. 168. **MH-BH**—The continuous recording during a year of condensation nuclei with the automatic counter of Verzár at Payerne, situated in a typical agricultural country, shows the following results: 1) the number of nuclei reaches a first maximum in April and a second in October, 2) the diurnal variation of nuclei shows two high peaks at sunrise and at sunset and 3) typical changes in nuclear content with air mass are found but these relations depend highly upon season. *Subject Headings:* 1. Nuclei diurnal variations 2. Nuclei annual variations 3. Nuclei and air masses 4. Automatic nuclei counters.—*Author's abstract.*

6I-97

551.574.1:551.508.91

Ackermann, P.; Bider, M. and Verzár, F. (*Switzerland*), **Kontinuierliche Messungen von atmosphärischen Kondensationskernen**. [Continuous measurements of atmospheric condensation nuclei.] *Geofisica Pura e Applicata*, Milan, 29:167, Sept./Dec. 1954. ref. **MH-BH**—Results of continuous measurements of atmospheric condensation nuclei which were made at 4 places in Switzerland during 1952-54 by means of actinometric counters (which register every 15 min.) for the first time, except briefly with an Aitken counter as reported by BRADBURY and MEURON (*Terres. Mag. and Atmos. Elec.*, 1938) are reported in 3 articles by authors (which are abstracted separately see items 6I-96, 6I-100 and 6I-123). *Subject Headings:* 1. Nuclei measurement networks 2. Automatic nuclei counters 3. Switzerland.—M.R.

6I-98

551.574.1:551.508.91

Armour Research Foundation, Chicago, **A moving slide impinger for sampling concentrated aerosols**. Contract AF 19(122)-472, Project C 022, Scientific Report, No. 16, Oct. 7, 1954. 6 p., fig., table. **MH-BH**—A moving slide impinger giving a uniform deposit, so that aerosol concentration and particle size distributions can be determined, has been developed for sampling concentrated aerosols. The usable particle size range varies from submicron particles to 10μ particles. The collector slide is moved past the impingement jet by a motor drive. Speeds from 10 to 180 mc/sec can be selected, so that aerosols of concentrations varying from 10^4 to 10^6 particles/cc can be sampled without any dilution. Proper design of the jet eliminates agglomeration of particles in the instrument. *Subject Headings:* 1. Nuclei size 2. Nuclei size measurement method.—*Author's abstract.*

6I-99

551.574.1:535.4

Armour Research Foundation, Chicago, **The determination of polydisperse aerosol size distributions from the analysis of light scattering data**. Contract AF 19(122)-472, Project No. C 022, Scientific Report, No. 12, May 1, 1952-Aug. 15, 1954. 36 p. eqs. **MH-BH**—The analytical problem of calculating the particle size distribution of a polydisperse aerosol from light scattering data is equivalent to the mathematical problem of solving an integral equation of the first kind. This integral equation will, in general, not have an exact solution if there are experimental errors in the light scattering data used. As a consequence, previously used approximate methods for obtaining a solution are completely unreliable. A new method has been developed for calculating that size distribution which represents the optimum compromise between experimental errors and unavoidable errors due to the necessarily approximate method of solving the integral equations. *Subject Headings:* 1. Nuclei size distribution 2. Nuclei measurement method.—*Author's abstract.*

6I-100

551.574.1:551.515.8

Bider, Max (*Basel Univ., Switzerland*), **Ergebnisse der eineinhalbjährigen Registrierungen der Anzahl der Kondensationskerne in Basel**. [Results of one and a half year of recording of condensation nuclei-counting at Basel.] *Geofisica Pura e Applicata*, Milan, 29:178-191, Sept./Dec. 1954. 12 figs., 9 refs. German and English summaries p. 178. **MH-BH**—On recordings of nuclei-countings (according to VERZÁR) over a period of one and a half year at Basel, the yearly and daily variations of the number of nuclei are discussed. The influence of wind direction and wind velocity on the number of nuclei is studied. A weekly periodicity of nuclei numbers is shown and the abundance of nuclei in different air masses is studied. Finally, the results of simultaneous recordings in the center and at the border of the city are communicated. *Subject Headings:* 1. Nuclei annual variations 2. Nuclei diurnal variations 3. Nuclei and wind 4. Nuclei and air masses 5. Basel, Switzerland.—*Author's abstract.*

6I-101

551.574.1

Bolton, J. G. and Qureshi, N. A., **The effects of air temperature and pressure on the decay of silver iodide.** *American Meteorological Society, Bulletin*, 35(9):395-399, Nov. 1954. 3 figs., table, 1 refs. **MH-BH**—Silver iodide smoke was produced by passing an atomized stream of solution (100 mg of AgI dissolved in a solution of 25 gm of NaI in a liter of acetone) from a commercial spray gun through the flame of a kerosene lamp. The smoke was sucked into a decay box from which samples were injected into a cloud chamber that contained ice crystals. It was found that: 1) the relative number of freezing nuclei decreases with time and that the rate of decay diminishes with time, 2) the effect of air temperature on the lifetime of the freezing nuclei is extremely critical since the concentration decreases to one tenth of the initial value in four to five hours at 0°C and in a few seconds at 100°C, 3) the time for the concentration of nuclei to fall to a given value is approximately inversely proportional to the air pressure and 4) decay rate is independent of sunlight and ultraviolet light. It is concluded that AgI released from the ground in warm climates is of slight use but may be very effective when released from aircraft or high mountains. *Subject Headings: 1. Artificial nuclei production 2. Nuclei experiments 3. Nuclei and sunshine 4. Nuclei and UV radiation 5. Nuclei decay 6. Silver iodide nuclei.—I.L.D.*

6I-102

551.574.1

Bossolasco, Mario, **Sulla genesi delle precipitazioni.** [On the origin of precipitation.] *Geofisica pura e Applicata*, Milan, 28:208-222, 1954. 7 figs., 9 refs. Italian, English and German summaries. 1 refs. **MH-BH**—Series of meteorological observations made in the Alps (Sonnblick, Zugspitze, etc.) have shown that the formation of snow and preservation of undercooled fog are controlled by air temperatures around -11°, -4°, -5°, and -19°C. This is in perfect agreement with freezing nuclei spectrum obtained by laboratory experiments. A diagram shows the variations of nuclei count with temperature ranging from 0° to -28°C. *Subject Headings: 1. Ice nuclei 2. Nuclei and temperature 3. Nuclei and fog 4. Nuclei and snow 5. Alps.—N.A.S.*

6I-103

551.574.1:535.4

Burt, Wayne V. (*Univ. Wash. Dept. of Oceanogr.*), **Specific scattering by uniform minerogenic suspensions.** *Tellus*, Stockholm, 6(3):229-231, Aug. 1954. 2 figs., 4 refs., 4 eqs. **MH-BH**—The Mie theory has been applied to determine the theoretical scattering from 1 mg/liter concentrations of uniformly-sized spherical particles over the size range from very small particles up to particles with a radius of 6 μ . The theoretical results compared favorably with experimental results recently published by JERLOV and KULLENBERG. *Subject Headings: 1. Mie theory 2. Nuclei size 3. Light scattering.—Author's abstract.*

6I-104

551.574.1

Croibeil, R., **Production of monodispersed nuclei and measurement of their size.** (In: *Monodispersed Nuclei*, Univ. Dept. of Chemistry, **Use of a diffusion cloud chamber to characterize condensation nuclei.** Contract AF 19(122)-380, Final Report, May 31, 1954. p. 13-15.) **MH-BH**—A LaMer-Hinclair generator was used to produce a monodispersed aerosol of dibutyl phthalate using sulphuric acid as the nucleating agent. An analysis of the aerosol indicated that each particle has of the order of 10⁶ H₂SO₄ molecules as nucleus. Variation of the acid concentration produced only a slight variation in the nucleus size corresponding to a similar variation in the partial vapor pressure of H₂SO₄ over these solutions. *Subject Headings: 1. Sulfuric acid nuclei 2. Artificial nuclei production 3. Nuclei size.—Author's abstract.*

6I-105

551.574.1

†Dessens, H., **Noyaux de condensation et pluie artificielle.** [Condensation nuclei and artificial rainfall.] *Puy-de-Dôme. Observatoire, Bulletin, Ser. 2*, No. 4:113-120, Oct./Dec. 1954. 2 figs., 1 refs. p. 119-120. **DWB**—In this paper the author reviews three recent publications and his own findings on these subjects as a summary of progress in the past 7 years (to 1954) on the relation of condensation nuclei to artificial precipitation. The first paper on natural condensation nuclei by MOORE and MASON (1954), distinguishes between two types of marine air mass nuclei concentration: 1) large nuclei, when wind is strong over the sea and 2) small nuclei when wind is <7 m/s, giving a distribution similar to continental air masses. Also two methods of formation of nuclei: a) condensation of vapor or chemical reaction (say NH₃HCl), industrial production, fires, etc. and b) by dislocation of matter by wind, etc. This leads to large nuclei ($r > 0.5\mu$) and process A to smaller (<0.5 μ) nuclei. The electron microscope permits identification down to 0.2 μ but no lower; optical methods, chemical analysis, etc. could be used for further detection of nuclei trajectories. Fragmentation operates when repeated desiccations occur (as in continental air masses) but this process, according to PACAUD (1949), is rare. KINOSITA (1954) is next reviewed. He has studied rate of

growth of various size particles in a cloud chamber. Finally, OGIWARA and KOBAYASHI (1954) are reviewed on growth of hygroscopic NaCl nuclei in convective clouds by coalescence or by condensation. The critical size is said to be $r = 23\mu$ or possibly in case of denser nuclei (10^{-9} g, 1 g/m^3) $r = 36\mu$. Finally, they conclude that seeding convective clouds with 1 to 10 nuclei per litre of 10^{-9} should lead to rain formation. (Same item as 6F-295, June 1955; see also 6H-152, Sept. 1955, M.A.B.) *Subject Headings:* 1. Large nuclei 2. Small nuclei 3. Nuclei and air masses 4. Nuclei and wind 5. Nuclei growth 6. Salt nuclei.—M.R.

6I-106

551.577.59:551.590.2

Dhar, O. N. (*Met. Office, New Delhi*), **Meteoric dust and rainfall.** *Indian Journal of Meteorology and Geophysics*, Delhi, 5(4):356-357, Oct. 1954. 2 figs., ref. DLC—Checking up on the BOWEN theory that peak rainfalls occur 30 days after a meteor shower, the author analyzes daily rainfall data for Nov.-Jan. 1900-1952 for Pamban and Madras on the Indian Peninsula and shows results for each station on 2 graphs. The peak rainfalls do correspond on the whole to the meteor showers (displaced 30 days) if enough leeway is allowed for variations of ± 2 days and for a number of cases where peaks do not correspond with showers of meteoric dust, or *vice versa*. *Subject Headings:* 1. Meteoric theory of rainfall 2. Meteoric nuclei 3. Nuclei and rain.—M.R.

6I-107

551.574.1:551.509.6

Eber, L. E.; Mordy, W. A. and Johnson, D. S., **Experiments in seeding clouds with hygroscopic materials.** (In Mordy, W. A. et al., **Cloud seeding project, Summary Report, 1952-1953.** Honolulu, 1954? p. 4.1-4.29. 17 figs., 3 tables, refs.) DWB—Results of 36 experiments attempting to produce rain by seeding clouds with powdered salt or with solutions of sodium chloride or calcium chloride, carried out in Hawaii, are presented. *Subject Headings:* 1. Salt nuclei 2. Liquid nuclei 3. Sodium chloride nuclei 4. Calcium chloride nuclei 5. Cloud seeding 6. Hawaii.—N.A.S.

6I-108

551.574.1:551.509.6

Eber, L. E., **Some aspects of seeding clouds from the ground.** (In Mordy, W. A. et al., **Cloud seeding project, Summary Report, 1952-1953.** Honolulu, 1954? p. 6.1-6.11. 3 figs., tables, refs.) DWB—Seeding tests in warm clouds have been made in Hawaii applying the technique directed toward increasing the number of large cloud droplets and thus increasing the number of potential rain drops. These droplets have been introduced either directly with spray apparatus or by introduction of hygroscopic crystals which will rapidly take on water by condensation and become droplets of the appropriate size. *Subject Headings:* 1. Hygroscopic nuclei 2. Crystalline nuclei 3. Cloud seeding 4. Hawaii.—N.A.S.

6I-109

551.510.42:551.574

Hentschel, G., **Untersuchungen über eine allgemeine Verwendungsmöglichkeit des Kernzählers zur Bestimmung der Art des atmosphärischen Aerosols und der Grösse seiner Partikel.** [Investigations of the general applicability of the nuclei counter for determining the type of a atmospheric aerosol and the size of its particles.] *Angewandte Meteorologie*, 2(2):33-47, May 1955. 7 figs., 4 tables, 13 refs. MH-BH—The small Scholz counter is filled to full volume of pump (5 cc) and the contents examined by stages of 1 cc. This indicates the weight of the aerosols. The large and smaller aerosols are examined by burning. Aerosol appears to include 2 extreme components: anthropogenous (combustion products) with very little loss (compare flame aerosols) and non-anthropogenous with very high loss. Loss is greater in polar than in föhn air. Room air (undisturbed and disturbed) and air inside and outside Wernigerode are compared. (Same item as 5.10-96, Oct. 1954, M.A.B.) *Subject Headings:* 1. Scholz nuclei counter 2. Aerosol analysis.—C.E.P.B.

6I-110

551.574

Isono, K. and Komabayasi, M. (*Tokyo Univ., Geophys. Inst.*), **The influence of volcanic dust on precipitation.** *Meteorological Society of Japan, Tokyo, Journal, Ser. 2*, 32(11/12):345-351, Nov./Dec. 1954. 5 figs., 5 tables, 6 refs., eq. In English. DWB. Also as: *Tokyo Univ. Geophysical Institute, Geophysical Notes*, 7(2), 1954, Contribution No. 32. Also as: *Collected Meteorological Papers*, Tokyo, 5(2), Dec. 1954, No. 75. DWB—It is conceivable that volcanic eruptions are one of the important sources which supply ice-forming nuclei and large condensation nuclei for the atmosphere. We have found statistically that volcanic eruptions of Mt. Asama have close relationship to the precipitation in neighboring districts, and experiments showed that volcanic dust particles of this mountain were effective as ice-forming nuclei at temperature below -14°C . These statistical and experimental results show that volcanic dust particles are important nuclei in the atmosphere and increase the amount of precipitation. *Subject Headings:* 1. Ice nuclei 2. Large nuclei 3. Volcanic nuclei 4. Mt. Asama, Japan.—Authors' abstract.

6I-111 551.574.1

†Keith, C. H. and Arons, A. B., The growth of sea-salt particles by condensation of atmospheric water vapor. *Journal of Meteorology*, 11 (3):173-185, June 1954. 9 figs., 4 tables, 18 refs., 21 eqs. WB. Also in: Woods Hole Oceanographic Institution, Contract Nonr-798 (00), Technical Report, No. 5, June 1953.—Measurements of the rate of growth of sea-salt particles have been made when the particle is shifted from an environment of dry air to one of relative humidity between 80 and 100%. For particles ranging in mass from 10^{-9} to 2×10^{-8} gram, agreement is found with growth rates predicted by an equation which principally differs from previous derivations in that empirical vapor-pressure data are utilized. The growth time is observed to be independent of ventilation at air speeds less than 30 to 40 cm per sec. The growth equation was reintegrated under variable humidity and temperature conditions corresponding to rates of lift observed in the atmosphere. The curves thus obtained approximately trace the growth of sea-salt particles rising from the sea surface to cloud base. (Same item as 5.9-216, Sept. 1954, MAB.) Subject Headings: 1. Sea salt nuclei 2. Nuclei growth 3. Nuclei and clouds 4. Nuclei growth theory.—Authors' abstract.

6I-112 551.574.1 (261)

Moore, D. J. and Mason, B. J., The concentration, size distribution and production rate of large salt nuclei over the oceans. *Royal Meteorological Society, Quarterly Journal*, 80 (346):583-590, Oct. 1954. 2 figs., table, 9 refs., 6 eqs. DLC—The sampling and measurement of large condensation nuclei (equivalent salt contents greater than 2×10^{-14} g) on board of Weather Ships in the N. Atlantic, 100 mi. from land, reveal the existence of two distinct types of size spectra. It seems that the nuclei which predominate when waves are breaking (Type I distribution) are the residues of spray droplets, but that those which occur with wind speeds of less than 7 m/sec have a (Type II) distribution which closely resembles that of continental aerosol. In winds of up to 15 m/sec⁻¹ the measured concentrations of large salt nuclei rarely exceeded 10/cm³. From the measured concentrations and size distributions of Type I nuclei, it is deduced that in winds of 15 m sec⁻¹ the rate of production at the sea surface of salt nuclei with mass greater than 10^{-13} g is about 40 cm⁻² sec⁻¹; very similar values have been obtained from laboratory experiments in a wind-wave tunnel. The corresponding rate of nuclei with $m \times 10^{-14}$ g would be about 100 cm⁻² sec⁻¹. Laboratory studies show that the bursting of air bubbles of diameters between 0.3 mm and 4 mm at the surface of sea water produces small numbers of rather large nuclei (diameters 50-500μ), the majority of which would fall back quickly into the sea. The large salt nuclei found in the atmosphere are probably the residues of smaller drops produced by disintegration of the bubble caps. (Same item as 6.3-234, March 1955 MAB.) Subject Headings: 1. Large salt nuclei 2. Nuclei count 3. Nuclei size distribution 4. Nuclei over ocean 5. North Atlantic.—Authors' abstract.

6I-113 551.574.1 (26)

Moore, D. J., Measurements of condensation nuclei over the ocean. *Marine Observer*, 24 (163): 18-21, Jan. 1954. 3 tables, 6 refs. MH-BH—General account of nature and origin of nuclei. Observations on O.W.S. "Weather Observer" are described and summarized in relation to connective activity and state of sea. (Same item as 5.10-176, Oct. 1954, MAB.) Subject Headings: 1. Nuclei size 2. Nuclei over ocean 3. North Atlantic.—C.E.P.B.

6I-114 551.574.1:551.578.41 (02)

*†Nakaya, Ukichiro, Snow crystals; natural and artificial. Cambridge, Harvard Univ. Press, 1954. 510 p. 188 plates, 514 figs., 39 tables, bibliog. p. 312-314. DLC—In this monograph on snow crystals, Chapter 8 deals with recent investigations on snow crystals and ice nuclei in the atmosphere and in the laboratory. The author points out in the last chapter that the work of SCHAEFER does not duplicate that of the author or vice-versa, since the researches of the former were concerned with artificial formation of ice nuclei whereas the latter deals with artificial snowflakes in more advanced stage. (Same item as 6.1-2, Jan. 1955, MAB.) Subject Headings: 1. Ice nuclei 2. Artificial snowflakes.—N.A.S.

6I-115 551.574.1

Rau, W. (Max-Planck-Inst. for Physics of Stratosphere, Weissenau, Württemberg), Die Eiskeimbildung bei Temperaturen unter -30°C . [Ice nuclei formation at temperatures below -30°C .] *Geofisica Pura e Applicata*, Milan, 29:201-211, Sept./Dec. 1954. 7 figs., 16 refs. German and English summaries p. 201. MH-BH—The formation of ice germs down to -85°C was investigated with artificial supercooled nebula. At low temperatures the densities of ice particles are so high that they could only be determined by photographs of the ice clouds with suitable enlargements. The multiplication of the number of ice particles which, according to assertions from another side, should take place at -40°C and which was interpreted by homogeneous formation of germs, could not be ascertained. In most cases the density of particles increases considerably at -30°C at the latest, and then remains practically constant between -40 and -65°C with an average of 174

ice particles per cm^3 . This transition which can directly be observed at the complete icing of the cloud of droplets, takes place—according to the weather conditions—between -40 and -50°C and must, therefore, also be caused by freezing nuclei. Extremely dense and constant nebula consisting of the finest ice particles with signs of homogeneous formation are only formed with an approximation to -70°C , which is in good agreement with earlier results of the author. *Subject Headings: 1. Ice nuclei 2. Nuclei formation 3. Nuclei and temperature.—Author's abstract.*

6I-116

551.574.1

Schaefer, Vincent J., *The concentration of ice nuclei in air passing the summit of Mt. Washington. American Meteorological Society, Bulletin*, 35(7):310-314, Sept. 1954. 3 figs., 4 refs. **MH-BH**—Ice nuclei concentration at a temperature of -16°C to -20°C was measured by drawing samples of air into a specially designed box (shown in a diagram) in which a supercooled cloud is formed and the number of ice crystals in the cloud is estimated. Observations were made over a period of eight months. The annual variations in relative nuclei concentration showed a maximum of low point values in June-Aug. and a minimum of low point values starting about Dec. Also the annual variation in ice nuclei count is analyzed separately for each year. Starting with 1950, each successive year showed the period of maximum low count in the summer months to be less marked until in 1953 it had nearly disappeared. A typical chart showing several air trajectories related to high count periods is included. (Same item as 6F-337, June 1955, *MAB.*) *Subject Headings: 1. Ice nuclei 2. Nuclei count 3. Nuclei annual variations 4. Mt. Washington, N. H.—I.L.D.*

6I-117

551.574.1

Schaefer, Vincent J., *Ice crystals formed spontaneously by the rapid expansion of moist air. Journal of Colloid Science*, N. Y., 9(2):175-181, April 1954. 3 figs., table, 6 refs. **DLC.** (Also in his: *Final Report, RL-1007, on Contract Nonr-925(00)*, with General Electric Research Laboratory, Schenectady, N. Y., Dec. 1953.) **DWB**—A cold-chamber experiment consisting of the observation of ice crystal formation due to rapid expansion of air is described. Air is expanded by breaking a pressurized glass sphere (diagram shows the apparatus). As a result of the experiment the author presents a graph and a table giving the number of ice crystals formed as a function of pressure, temperature and moisture; and a graph illustrating the relationship of critical size of nuclei to temperature. *Subject Headings: 1. Spontaneous nucleation experiment 2. Ice crystal formation 3. Nuclei size 4. Nuclei and temperature.—G.T.*

6I-118

551.574.1

Schiff, Daphne, *Cloud chamber construction and operation.* (In: Montreal. Univ. Dept. of Chemistry, *Use of a diffusion cloud chamber to characterize condensation nuclei.* Contract AF 19(122)-380, Final Report, May 31, 1954. p. 8-12.) **MH-BH**—Several types of diffusion cloud chambers for use in condensation nuclei studies are described and illustrated. The problem of controlling the temperature and humidity gradients was solved by trying hot air, hot water, dry ice, oil and various methods of introducing moisture into the system. Different chemical nuclei (NaCl , CaCl_2 , LiCl and CuSO_4) produce condensation in a saturated atmosphere and NaCl and LiCl with 90% humidity. *Subject Headings: 1. Nuclei experiments 2. Salt nuclei 3. Calcium chloride nuclei 4. Lithium chloride nuclei.—M.R.*

6I-119

551.509.67:551.551

Serra, Louis, *Diffusion dans l'atmosphère des noyaux d'iodure d'argent.* [Atmospheric diffusion of silver iodide nuclei.] *Puy-de-Dôme, Observatoire, Bulletin*, Ser. 2, No. 3:65-76, July/Sept. 1954. diags., table. **DWB**—In order to control properly the number of AgI nuclei which will be introduced into a given cloud or portion thereof it is necessary to accurately calculate the temperature gradient effects, the lines of equal concentration (theoretical and actual), the effect of several generators, and the effect of horizontal and vertical air movements around or over hills and other topographic features. Some of these problems are worked out theoretically and with a view to determine the order of magnitude of these factors. *Subject Headings: 1. Silver iodide nuclei 2. Nuclei diffusion 3. Cloud seeding 4. Nuclei theories.—M.R.*

6I-120

551.574.1

†Shishkin, N. S., *Oblaka, osadki i grozovoe elektrichestvo.* [Clouds, precipitation and thunder-storm electricity.] Moscow, Gosud. Izdat. Tekhniko-Teoreticheskoi Literatury, 1954. 280 p. 82 figs., 21 tables, 156 refs. **DLC**—Ch. 5 deals with condensation nuclei and growth of drops and ice-crystals in the atmosphere. Marine and continental hypotheses of nuclei origin are discussed and LANDSBERG's data used as proof for the latter one. Flight data obtained by ZARTSEV are presented graphically showing the vertical distribution of nuclei in fair weather with cumuli clouds. A rapid increase of nuclei content occurred right below the cloud. The problem of nuclei size

tribution is treated mathematically using the asymptotic formula of SMOLUKHOVSKIĬ, which was originally derived for Brownian movement and applied to nuclei since they participate in this process also. The growth of drops by condensation and growth of spherical ice particles by sublimation are also given full theoretical treatment. (*Same item as 6.3-1, March 1955, M.A.B.*) *Subject Headings:* 1. Nuclei theories 2. Nuclei size distribution 3. Nuclei sources 4. Sublimation nuclei 5. Nuclei and clouds 6. Flight data.—N.A.S.

6I-121

551.574.1

Smirnov, N. S.; Tantsova, N. N., and Shaposhnikova, I. I., **K voprosu o proiskhozhdenii iader kondensatsii.** [On the origin of condensation nuclei.] *Akademiia Nauk SSSR, Izvestiia, Ser. Fiz.*, No. 3:293-298, 1954. 8 tables, 5 refs. **DLC**—Investigation of the origin of condensation nuclei has shown that industrial centers are producing high concentration of nuclei and are contributing considerably to the total balance of nuclei in the atmosphere. Precipitation, fog and high humidity of the air are recognized as the main factors purifying the atmosphere from nuclei. *Subject Headings:* 1. Nuclei source 2. Nuclei in industrial centers 3. Nuclei eliminating agents 4. Nuclei and rain 5. Nuclei and fog.—N.A.S.

6I-122

551.508.91:551.507.352:551.574.1:551.509.67

Smith, E. J. and Heffernan, K. J., **Airborne measurements of the concentration of natural and artificial freezing nuclei.** *Royal Meteorological Society, Quarterly Journal*, 80(344):182-197, April 1954. 10 figs., 5 tables, 11 refs. **MH-BH**—An apparatus for observation of freezing nuclei by aircraft is described. Number of ice crystals estimated visually was recorded as a function of temperature and converted to concentration of freezing nuclei by an experimental factor obtained with silver iodide smoke. Observations of natural freezing nuclei on 31 flights near Sydney, Australia are analyzed. Temperature of complete glaciation was $-35.5 \pm 1^\circ\text{C}$, highest temperature for 1 crystal/liter was around -20 to -24°C . Concentration of nuclei around a silver iodide generator on the ground was plotted up to 1200 m height. (*Same item as 5.9-10, Sept. 1954, M.A.B.*) *Subject Headings:* 1. Ice nuclei 2. Silver iodide nuclei 3. Nuclei counters.—C.E.P.B.

6I-123

551.574.1(683)

Verzár, F. (*Univ. of Basel, Physiological Inst.*), **Kontinuierliche Zählung von atmosphärischen Kondensationskernen in St. Moritz.** [Continuous counting of atmospheric condensation nuclei in St. Moritz.] *Geofisica Pura e Applicata*, Milan, 29:192-200, Sept./Dec. 1954. 15 figs., 4 refs. German and English summaries p. 192. **MH-BH**—1) With the automatic condensation nucleus counter the number of atmospheric condensation nuclei was recorded during 12 months in the years 1952, 1953 and 1954. 2) The daily variation in median values per month, the daily variation on sunny and cloudy days, and the daily variation at different wind directions are described. 3) The records in two different places in Basel and in St. Moritz are compared. *Subject Headings:* 1. Nuclei diurnal variations 2. Nuclei and clouds 3. Nuclei and sunshine 4. Basel, Switzerland 5. St. Moritz, Switzerland.—*Author's abstract.*

6I-124

551.574.1:551.508.91

Vittori Antisari, Ottavio, **Sulla determinazione della distribuzione nell'atmosfera di nuclei di condensazione e di particelle ottenute per sublimazione.** [Determining the distribution in the atmosphere of condensation nuclei and of vapor sublimation particles.] (In: Italy. Servizio Meteorologico dell'Aeronautica, **Il Servizio Meteorologico dell'Aeronautica Italiana alla X Assemblea Generale U.G.G.I. Rome, 1954.** p. 79-84. 8 figs., 6 refs. English summary p. 79.) **DWB**—Describes the technique used for the detection of submicroscopical particles obtained by AgNO_3 vapor sublimation, by means of the sensitized Liesegang reaction, which gives rise to colored products around the precipitates in gelatin. The device for capturing and detecting particles is also illustrated. Preliminary tests in flight have shown the possibility of capturing, detecting and counting submicroscopical particles of a particular chemical nature in the air. *Subject Headings:* 1. Nuclei critical distribution 2. Nuclei instruments 3. Nuclei investigation methods 4. Liesegang nuclei detection method.—*Author's abstract.*

6I-125

551.574.1:551.508.91

Vittori Antisari, Ottavio, **Sur la détection des particules de chlorures.** [On the detection of chloride particles.] *Puy-de-Dôme. Observatoire, Bulletin*, Ser. 2, No. 4:97-98, Oct./Dec. 1954. **DWB**—Note on method (LIESEGANG, 1896) of preparation of the gelatin for collecting chloride particles, for preserving the gelatin, for preparing the sensitized slides and, finally, for exposing the slides. Rings produced by nuclei of 10^{-10} g are visible with slight magnification. *Subject Headings:* 1. Chloride nuclei detection methods 2. Liesegang nuclei detection method.—M.R.

6I-126

551.574

Wexler, Raymond, **Growth of rain in warm clouds.** Woods Hole Oceanographical Institution Contract N6onr-27702 (Nr-082-021), Technical Report, No. 28, May 1954. 23 p. 4 figs., 4 tables, 10 refs. p. 21-22. **DWB**—Observations and theory of rain from warm clouds are reviewed. A analysis of the role of giant sea nuclei in these clouds indicates that there is a critical nucleus size which can become the largest raindrop, while larger nuclei become smaller raindrops. A theoretical analysis is made of the production of rain in warm clouds. (Same item as 6F-347, June 1955, *MAB*.) **Subject Headings:** 1. Giant nuclei 2. Critical nuclei size 3. Largest possible raindrops.—*Fr. author's abstract.*

6I-127

551.574.1 (260)

†Woodcock, Alfred H. and Mordy, W. A., **Salt nuclei, wind and daily rainfall in Hawaii.** (I. Mordy, W. A. et al., **Cloud seeding project, Summary report, 1952-1953.** Honolulu, 1954? p. 3.1 3.21. 8 figs., table, 17 refs.) **DWB**—Investigation of the problem of to what extent the number of salt particles, or wind, or both factors contributed to rainfall in Hawaii. Salt nuclei have been sampled from aircraft at cloud levels for forty-two days and observations of cloud base distance to inversion, cloud base height over sea, and wind speed at several levels have been taken simultaneously. Data are presented in a table. It has been found that increased values of cloud-base to-inversion distance and salt nuclei number are generally attended by increased rainfall amount. **Subject Headings:** 1. Salt nuclei 2. Nuclei and rain 3. Nuclei and wind 4. Nuclei and cloud 5. Nuclei vertical distribution 6. Hawaii.—*N.A.S.*

6I-128

551.574

Zenker, H., **Waldeinfluss auf Kondensationkerne und Lufthygiene.** [Forest influence on condensation nuclei and atmospheric hygiene.] *Zeitschrift für Meteorologie*, 8(5):150-159, May, 1955. 9 figs., table, 5 refs. **DWB**—The author investigated the influence of non-foliated high forest, of pine forest and of a wooded area upon the nuclei content of the atmosphere. The nuclei count 5 m in front of the forest and at the forest edge diminishes by 27 to 45% and continues to diminish from the forest edge to 50 m within the forest by 20 to 39%. The decline in nuclei count varies with the type of forest. (Same item as 6.7-253, July 1955, *MAB*.) **Subject Headings:** 1. Nuclei count 2. Nuclei in forests.—*I.L.D.*

1955

6I-129

662.2:539.1:551.574

Best, A. C., **Atomic explosions and condensation nuclei.** *Meteorological Magazine*, London, 84(997):201-204, July 1955. 4 refs., eqs. **DWB**—The supersaturation necessary for a droplet carrying an electric charge to grow indefinitely is calculated. Even with 100 electronic charges supersaturation of 7% is necessary. Both conditions are improbable. Solid particles require a charge of 50 e.u. to be effective as condensation nuclei. A vertical current of 48 ft/sec would be necessary to maintain a humidity of 100.5%. Atomic explosions are unlikely to affect condensation at a distance. **Subject Headings:** 1. Nuclei and atomic explosions 2. Charged nuclei 3. Supersaturation.—*C.E.P.B.*

6I-130

551.574

†Birstein, Seymour J. and Anderson, Charles E., **The mechanism of atmospheric ice formation. Pt. 1. The chemical composition of nucleating agents.** *Journal of Meteorology*, 12(1):68-73, Feb. 1955. 4 figs., 2 tables, 24 refs. **DWB**—Summary of researches at U. S. Air Force Cambridge Research Center. Nuclei of numerous substances were prepared by heating in nitrogen and passed into a cryostat. A cloud was produced in the cloud chamber and tested for ice formation. Several substances previously reported as ice nuclei, including some iodides, were ineffective in a nitrogen atmosphere, probably because of inhibition of oxidation. Iodides of silver, lead, sodium, potassium and tin, and silver sulfide, all remained effective. Sprays of salt solutions were ineffective. Mechanism of initiation of ice formation is discussed. (Same item as 6.5-215, May 1955, *MAB*.) **Subject Headings:** 1. Artificial nuclei production 2. Ice nuclei.—*C.E.P.B.*

6I-131

551.574

Birstein, Seymour J., **The role of adsorption in heterogeneous nucleation. Pt. 1, Adsorption of water vapor on silver iodide and lead iodide.** *Journal of Meteorology*, 12(4):324-331, Aug. 1955. 13 figs., 8 refs. **DLC**—The adsorption of water vapor on silver iodide and lead iodide was measured to determine whether a relationship exists between the ability of a particle to take up water vapor on its surface and its nucleating ability. It was found that nucleating ability is closely linked with the capacity of a solid to absorb water vapor on its surface. From the adsorption isotherms on the silver iodide and lead iodide at -20°C, and supplementary experiments, it was determined that it is not necessary for the nucleating system to go through water saturation before ice-crystal formation.

an occur. *Subject Headings:* 1. Silver iodide nuclei 2. Lead iodide nuclei 3. Nuclei adsorption properties 4. Ice-crystal formation.—*Author's abstract.*

- 6I-132 551.574.1:551.590.25
Cwiling, B. M., **Abnormal freezing nuclei in the atmosphere.** *Nature*, London, 176(4472): 29-30, July 16, 1955. 2 refs. **DWB**—Normally very few nuclei are present active above -32°C . from Jan. 13-30, 1955, numerous large nuclei appeared at Panama active at -18 to -13°C accompanied by very heavy rain. Nuclei active at -13°C were again observed on May 23-25. They were observed elsewhere also and are attributed to meteoric showers. *Subject Headings:* 1. Ice nuclei 2. Large nuclei 3. Meteoric nuclei 4. Panama.—*C.E.P.B.*

- 6I-133 551.574.1
Facy, L., **La capture des noyaux de condensation par chocs moléculaires au cours des processus de condensation.** [The capture of condensation nuclei by molecular collision in the process of condensation.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 8(3):229-236, 1955. French, German and English summaries p. 229-230. **DWB**—The processes of transfer of water vapor round an evaporating or condensing droplet may be studied by introducing submicroscopic particles of inert aerosol. The trajectories of these, seen against a black background by lateral illumination, show the impacts of the water molecules moving to or from the droplet under observation. An evaporating droplet is surrounded by a cleared space, while a condensing droplet shows a process of capture. This process explains the removal of pollutants by condensing clouds. *Subject Heading:* 1. Nuclei theories.—*C.E.P.B.*

- 6I-134 551.574.1:551.577.11 (54)
Fournier d'Albe, E. M., **Giant hygroscopic nuclei in the atmosphere and their role in the formation of rain and hail.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 8(3):216-228, 1955. fig., 3 tables, 14 refs., 3 eqs. English, German and French summaries p. 216. **DWB**—Salt particle content of surface air was sampled at 5 stations in West Pakistan from coast (Karachi) to 1000 km inland and 1700 m elevation. Size distribution shows that particles up to $>10^{-9}$ gr may penetrate far inland. They increase in monsoon (maritime air) and correlate highly with dew point. From calculations of "half life," particles $>10^{-9}$ gr met far inland are of local origin. The production of rain (from nonfreezing clouds) by the break-up of droplets >7 mm diameter in an up-current of 5 m/s is discussed. The development of heavy rain involves 3 stages: condensation, coalescence and multiple fragmentation. Seeding is only likely to be effective when conditions for multiple fragmentation are not present. *Subject Headings:* 1. Giant nuclei 2. Salt nuclei 3. Nuclei size distribution 4. Nuclei and monsoon 5. West Pakistan.—*C.E.P.B.*

- 6I-135 551.574.1
†Hosler, Charles L. and Spalding, G. Robert, **An experimental study of the effects of aerosols of a number of pure chemicals on the freezing characteristics of supercooled liquid droplets.** Pennsylvania. State Univ. Mineral Industries Experiment Station. Dept. of Meteorology, Contract AF 19(604)-140, Final Report, Jan. 31, 1955. 79 p. 15 figs., 6 tables, 32 refs. **DWB**—A series of experiments have been conducted to contribute to our knowledge of the formation of the ice phase in clouds. The roles of droplet size, type of condensation nuclei and the size of the condensation nuclei were examined. Experiments with clouds show that the qualitative results obtained with capillaries and droplets are applicable to clouds in the case of the very soluble salts used as condensation nuclei, but the relative activity of the soluble and insoluble salts does not stay the same for the nuclei size ranges employed. All aerosols used showed the freezing temperature of clouds to be a function of the size of the condensation nuclei. Very insoluble salts are proportionately more active in raising the temperature of ice formation when they serve as condensation nuclei in clouds than when used in solution in capillaries or captive droplets. It is apparent that on the one hand ions in solution are raising the freezing point and on the other, crystalline nuclei are acting as surfaces upon which ice formation is encouraged by the crystal structure of the nuclei. Explanations of these two effects are discussed. *Subject Headings:* 1. Crystalline nuclei 2. Soluble nuclei 3. Salt nuclei 4. Nuclei size.—*Authors' abstract.*

- 6I-136 551.574.1
Houghton, Henry G., **On the chemical composition of fog and cloud water.** *Journal of Meteorology*, 12(4):355-357, Aug. 1955. 2 tables, 6 refs. **DLC**—The partial chemical analysis of some ninety samples of fog and cloud water is reported. The fog samples were collected at four locations along the northeast coast of North America, and the cloud samples were obtained on Mount Washington, New Hampshire. It is found that the soluble nuclei are predominantly chlorides and sulfates. The chlorides are dominant in air with a recent trajectory over the sea, while the sulfate is always present. In many cases it appears that much of the sulfate is in the form of sulfuric

acid. *Subject Headings:* 1. Soluble nuclei 2. Chloride nuclei 3. Sulfuric acid nuclei 4. F. nuclei 5. Nuclei trajectories 6. Atlantic Coast 7. Mt. Washington, N. H.—*Author's abstract.*

6I-137

551.577.

†Mason, B. J., The physics of natural precipitation processes. *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 8(3):159-179, 1955. 11 figs., 2 tables, 28 refs. English, German and French summaries p. 159. DWB—The nature of precipitation elements and the process releasing precipitation from clouds, with their summits above or below 0°C, are set out. Airplot observations of summit temperatures of layer clouds and shower clouds producing rain or drizzle in middle and low latitudes are shown in graphs and tables. The theory of rain production by ice-forming nuclei is discussed. The necessary numbers of nuclei originate by splintering during collision and frictional drag. The growth rate of water drops by coalescence is set out. The release of precipitation from cumulus clouds is next considered: onset, showers produced by coalescence in relation to temperature of cloud base and summit, taking account of updraft and, finally, formation of hailstones. The various mechanisms in layer and shower clouds are shown schematically. *Subject Headings:* 1. Ice nuclei theory 2. Nuclei source 3. Precipitation physics.—C.E.P.B.

6I-138

551.574.1(

Oliver, Mildred B. and Oliver, Vincent J., Rainfall and stardust. *American Meteorological Society, Bulletin*, 36(4):147-151, April 1955. 3 figs., 2 tables, 7 refs. DWB—Testing BOWEN hypothesis of rainfall singularities as resulting from cosmic cloud seeding, the authors carried out a statistical investigation of African rainfall data and found that until it is demonstrated that fluctuations of meteoric nuclei in the atmosphere vary in a manner similar to the observed heavy rainfall variations, the BOWEN "Stardust" theory remains unproven. BOWEN's measurements of the concentration of ice crystal nuclei in the atmosphere of the Southern Hemisphere have shown at times, even above inversions, certain abnormally high concentrations of nuclei which could not be accounted for by any known terrestrial source. The only possible source seemed to be the debris from meteor showers. *Subject Headings:* 1. Meteoric nuclei 2. Nuclei and rain 3. BOWEN "Stardust" theory 4. Africa.—N.A.S.

6I-139

551.574.1:551.508.

Pollak, Leo W., Condensation nuclei. Symposium in Dublin. *Nature*, London, 175(4468):1072-1073, June 18, 1955. DWB—Account of a symposium on condensation nuclei held in the School of Cosmic Physics in Dublin, April 26-28, 1955. S. MCWILLIAMS and W. A. MORGAN have taken nuclei counts with a photoelectric counter twice daily over a four year period at Valentia Observatory along with observations of meteorological elements, and investigated their interrelationships. The majority of counts gave less than 500 nuclei per cm³. Increasing relative humidity was usually accompanied by decreasing nuclei concentration. Nuclei annual variation followed fairly closely that of duration of bright sunshine. M. BIDER presented a similar investigation for Basle. He used the Verzár automatic nuclei counter. The increase of nuclei concentration with sunshine was noted here also. Simultaneous records in the center of the city and on the outskirts, at a distance of 1.5 km, have shown that on the average the concentration in the center (46,000 nuclei/cm³) is about eight times that on the outskirts, but the variations at both points were strikingly similar. G. J. DAY reported on measurements of condensation nuclei made with a direct beam photoelectric counter during ten aeroplane ascents over the British Isles in anticyclonic situations. RITA CALLAHAN SAGALYN (U.S.A.F. Cambridge Research Center) reported on concentration, mobility and distribution of charged nuclei in fair weather at heights of 500-20,000 ft. New methods for counting nuclei and measurement of their size were also presented. *Subject Headings:* 1. Nuclei conferences 2. Nuclei and humidity 3. Nuclei and sunshine 4. Nuclei in city air 5. Nuclei and anticyclones 6. Charged nuclei 7. Nuclei vertical distribution 8. Nuclei instruments 9. Valentia, Ireland 10. Basle, Switzerland.—N.A.S.

6I-140

551.574

Rau, W., Wirkungsbereiche und Häufigkeit der natürlichen Gefrierkerne. [Effective range and frequency of natural freezing nuclei.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 8(3):185-203, 1955. 14 figs., 5 refs. German, English and French summaries p. 185-188. DWB—Laboratory studies of supercooling and the action of freezing nuclei at Weissenau are described. Maxima occur at -4, -11 to -12 and -19°C, the frequency at lower temperatures increasing with decreasing size of droplets. This is attributed to changes in the structure of water with falling temperature. Freezing temperatures are lower in aqueous solutions. Active nuclei are numerous in maritime polar air but rare or absent in continental subtropical air, and it is considered that these freezing nuclei are of maritime origin. Between -40 and -50°C a mixed cloud (ice crystals and droplets) freezes entirely. At -70°C there is a rapid increase in the number of ice nuclei. In the absence of nuclei ice particles can be formed at slight supercooling by dielectric

polarization. *Subject Headings:* 1. Ice nuclei 2. Nuclei and maritime air 3. Nuclei and continental air 4. Weissenau, Germany.—*C.E.P.B.*

6I-141

551.574.1

Smith, E. J.; Heffernan, K. J. and Seely, B. K., The decay of ice-nucleating properties of silver iodide in the atmosphere. *Journal of Meteorology*, 12(4):379-385, Aug. 1955. 2 figs., 2 tables, 9 refs. **DLC**—Finely divided zinc sulfide and freezing nuclei in the form of silver-iodide smoke were released from separate generators at the same time from the same position on the ground. Both were detected simultaneously at distances up to 56 kilometers downwind from the receptive generators, by apparatus installed in an aircraft. The comparative concentration was used as a measure of deterioration in the ice-nucleating properties of silver iodide. The total number of freezing nuclei, effective at -17°C , in silver-iodide smoke from a hydrogen burner, decreased by a factor of ten after eight minutes of exposure in the free atmosphere. The corresponding time with use of a kerosene burner was 50 minutes. The rate of decrease in the number of freezing nuclei was not influenced by the cloud cover. *Subject Headings:* 1. Zinc sulfide nuclei 2. Ice nuclei 3. Silver iodide nuclei 4. Nuclei and wind 5. Nuclei and clouds.—*Authors' abstract.*

6I-142

551.574.1

†Snyder, N. W. and Dhanak, A. M., A study of the measurement of sublimation nuclei by means of ice crystal count and their activation due to temperature. (Aug. 1953). *California. State Water Resources Board, Bulletin*, No. 16 (Append. G):194-210, June 1955. 10 figs. (fold.), bibliog. p. 208-210. **DWB**—Literature on nuclei classification and on the activity of various types of nuclei is reviewed. Results of a series of nuclei experiments are described in detail. They include experiments with nuclei activation, artificial nucleation and spark discharge effect. Results of snow crystal count with natural nuclei present are also discussed. *Subject Headings:* 1. Sublimation nuclei 2. Nuclei experiments 3. Artificial nucleation 4. Nuclei classifications 5. Literature reviews.—*N.A.S.*

6I-143

551.574.1

Soulage, Guy, Étude de générateurs de fumées d'iodure d'argent. [Study of silver iodide smoke generators.] *Puy-de-Dôme. Observatoire, Bulletin*, Ser. 2, No. 1:1-8, Jan./March 1955. 5 figs., 6 refs. French and English summaries p. 1. **DWB**—The combustion of silver iodide impregnated charcoal (1.5% silver iodide) without forced ventilation produces 10^{14} nuclei active at -20°C ; only one per cent among these nuclei are found active at -10°C . The scattering of the time values between the moment at which the nuclei go into a cloud at temperature below 4°C and the moment at which they act as ice-forming nuclei is supposed to be very important for the experiments of cloud modification. Lastly, the number of ice-forming nuclei produced by charcoal generator decreases with the silver iodide concentration in charcoal and increases with the ventilation of the fire. *Subject Headings:* 1. Artificial nuclei production 2. Silver iodide nuclei 3. Ice nuclei.—*Author's abstract.*

6I-144

551.574.1

Soulage, Guy, Resultats préliminaires d'une étude expérimentale des noyaux glaçogènes naturels. [Preliminary results of an experimental study of natural freezing nuclei.] *Archiv für Meteorologie, Geophysik und Bioklimatologie*, Ser. A, 8(3):211-215, 1955. 3 figs., 12 refs. French, German and English summaries p. 211. **DWB**—Crystals of ice appear in supercooled water drops at -12 to -16°C . Residues of these crystals were of three types: I. solid, II. liquid kernels, III. hypothetical nuclei of diameter $<1\mu$. Types II and III and some Type I were inactive at temperatures down to -21°C but some Type I (about 1 per liter) were glaciogenous below a critical temperature. These are of indefinite shape, diameter 7μ upwards, non-crystalline and hygroscopic above R.H. 90%. *Subject Headings:* 1. Ice nuclei 2. Hygroscopic nuclei 3. Nuclei size.—*C.E.P.B.*

6I-145

551.574.1

Soulage, Guy, Sur la constitution et l'activité glaçogène des noyaux de congélation atmosphériques. [On the structure and ice producing action of atmospheric freezing nuclei.] *Académie des Sciences, Paris, Comptes Rendus*, 240(22):2168-2170, June 1, 1955. 3 refs. **DLC**—Atmospheric freezing nuclei ranging in size from a few microns to 25μ were broken into fragments of the order of 1μ by means of a micromanipulator. Only one of the fragments of a nucleus was ever found to have ice-forming properties. This leads to the conclusions that: 1) the soluble part of a nucleus does not, in itself, promote ice formation and 2) only a limited portion of the insoluble part of a nucleus has ice-forming properties. It may thus be assumed that freezing nuclei are an agglomeration of various substances including one or a limited number of particles with ice-forming properties. Details of atmospheric ice formation are discussed in the light of this hypothesis. *Subject Headings:* 1. Nuclei theories 2. Ice nuclei.—*G.T.*

6I-146

551.574.1(94)

Twomey, S., The distribution of sea-salt nuclei in air over land. *Journal of Meteorology* 12(1):81-86, Feb. 1955. 9 figs., 6 refs. DWB—Maritime air was followed from the coast, and measurements of sea-salt nucleus distribution were carried out. It was found that the concentration encountered in air which had been over land for a considerable time ranged from very low values to values approaching those usually found in maritime air. It also seemed that convective cloud formation or precipitation rapidly lowered the salt concentration. In the absence of such factors, no appreciable diminution in total concentration occurred; vertical mixing, however, often gave rise to elevated salt concentrations at higher levels. Very low concentrations were found above post-frontal subsidence inversions over land, in air streams which had recently come from over the ocean. (Same item as 6.5-223, May 1955, MAB.) *Subject Headings:* 1. Sea salt nuclei 2. Nuclei distribution over land 3. Nuclei in maritime air 4. Nuclei and clouds 5. Nuclei and rain 6. Nuclei and inversions 7. Australia.—*Author's abstract.*

6I-147

551.510.42:551.510.4

Vittori Antisari, Ottavio, Détermination de la nature chimique des aérosols. [Determination of the chemical nature of aerosols.] *Archiv für Meteorologie, Geophysik und Bioklimatologie*, Ser. A 8(3):204-210, 1955. 6 refs. French, German, English and Italian summaries p. 204. DWB—Methods developed at Monte Cimone, based on the Liesegang reaction, for analyzing submicroscopic particles (down to 10^{-16} gr) are described. They use physico-chemical reactions in gelatin sensitized with AgNO_3 or other salts. *Subject Headings:* 1. Submicroscopic nuclei 2. Liesegang nucleation detection method.—*C.E.P.B.*

6I-148

551.574.1:551.594.1

Yonezawa, Toshiyuki, On the influence of electron-ion diffusion on the electron density and height of the nocturnal F2 layer. *Japan. Radio Research Laboratories, Tokyo, Journal*, 2(8):125-136, April 1955. table, 17 refs., 41 eqs. DWB—Influence of electron-ion diffusion on the electron density and height of the nocturnal F2 layer is considered. It is shown that under some reasonable assumptions Chapman's distribution of electron density does not change its form through electron-ion diffusion, only the lowering of the level of maximum electron density is brought about, the amount of which depends on the molecular density, scale height, and temperature at the height of the layer. It is also shown that any initial distribution of electron density tends to Chapman's one as time elapses, though there is a minor restriction on the initial distribution. As the actual F2 layer does not exhibit any systematic tendency of lowering after sunset, we can obtain the lower limit to the atmospheric molecular density in the F2 region, which is found to be $5 \times 10^9 \text{ cm}^{-3}$ and by about one order of magnitude larger than the value obtained by extrapolating rocket data. *Subject Heading:* 1. Ion diffusion.—*Author's abstract.*

SUPPLEMENTARY MATERIAL

6I-149

551.574.

Collins, F. C., The lag in spontaneous nucleation due to nonsteady state effects. *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 37: Vol. 1:163-180, July 1955. fig., table, 9 refs., 23 + eqs. DLC—At supersaturation ratios sufficient to provide nucleation according to the Becker-Doering theory, there may be a measurable delay in nucleation which may be explained by the relaxation time required for the attainment of the steady state concentrations of embryos of various sizes upon which the Becker-Doering calculations are based. An approximate solution to the problem is developed which enables an estimate of the minimum limit of relaxation time to be made on the basis of the surface tension of the critical nucleus, the supersaturation ratio and the molecular encounter frequency. *Subject Heading:* 1. Nucleation theory.—*N.A.S.*

6I-150

551.574.1:0

†Conference on Interfacial Phenomena and Nucleation, Boston Univ., Aug. 1951. *Proceedings U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 37, July 1955. 3 vols. figs., photos, tables, bibliog. Contents: Vol. 1, Conference on nucleation. 225 p. Vol. 2, Conference on nucleation and surface tension. 190 p. Vol. 3, Conference on adsorption. 123 p. DLC—This conference was distinguished by the extent and variety of the fields of interest of the conferees. Among the representatives were aeronautical engineers, physical chemists, metallurgists, physicists and meteorologists, including visitors from England, Sweden and Germany. The common interest was the study of the kinetic aspects of phase transitions. Physical chemists threw light on the initial steps of heterogeneous nucleation. Significant comments were made on the internal consistency of the heuristic, available theory for the nucleation rate. Metallurgists contributed information concerning the techniques for observing nucleation rates in condensed systems. Nu

ation of gases in very rapid expansion encountered in wind tunnels was treated by aeronautical engineers. Meteorologists contributed to the complicated problem of condensation in the atmosphere; these contributions published in the 1st vol. of the *Proceedings* of the Conference have been abstracted separately and added to this bibliography as supplementary material. (See items 1-156, 61-157, 61-158, 61-159, 61-162, 61-163 and 61-165.) *Subject Heading: 1. Nuclei conferences.* -N.A.S.

61-151

551.574.1:06

Conference on the Physics of Cloud and Precipitation Particles, Woods Hole Oceanographic Institution, Sept. 7-10, 1955. [Program] of the Conference sponsored by Geophysics Research Directorate, Air Force Cambridge Research Center, Air Research and Development Command, and Office of Naval Research, under the auspices of the American Geophysical Union of the National Academy of Sciences—National Research Council. 1 p. (fold.).—The program of this conference contained the following reports to be given on nuclei in the atmosphere: 1. Junge, C. E., Remarks about the size distribution of natural aerosols. 2. Myers, H. R., Distribution in the atmosphere of certain particles capable of serving as condensation nuclei. 3. Fournier d'Albe, E. M., Some observations of the geographical distribution of giant hygroscopic nuclei. 4. Nakaya, Ukichiro, Electron-microscope studies on the nuclei of sea fog and snow crystals. 5. Schaefer, Vincent J., The question of meteoric dust in the atmosphere. 6. Junge, C. E., Some facts about meteoric dust. 7. Junge, C. E., The vertical distribution of aerosols over the ocean. 8. Weickmann, Helmut, Recent measurements of the vertical distribution of Aitken nuclei. 9. Sagalyn, Rita C., Investigation of the time variations of charged nuclei in the atmosphere. 10. Junge, C. E., Facts and problems of chemical composition of condensation nuclei in unpolluted and polluted atmospheres. 11. Lodge, P., Jr. and Tufts, B. J., Techniques for chemical identification of micron and submicron particles. 12. Vonnegut, B. and Moore, C., Electrostatic method for the measurement of aerosols. 13. Birnstein, S. J., The role of adsorption in water condensation. 14. Anderson, C. E., Condensation on natural nuclei. . . . 20. Mason, J. E., Ice and nuclei of ice formation. 21. Kassander, A. R.; Sims, L. L. and McDonald, J. E., Observations of freezing nuclei over the southwestern United States. 22. Turnbull, D., Remarks on the theory of heterogeneous nucleation of crystals. 23. Anderson, C. E., Studies on re-evaporation ice nuclei. 24. Hosler, C. L. and Spalding, G. R., The effect of condensation nucleus size and type on the temperature of ice-crystal formation in clouds. 25. Birnstein, S. J., Studies of the effect of certain chemicals on the inhibition of nucleation. 26. Bram, R. R., Jr. and Sievers, J. R., Overseeding of cumulus clouds. . . . 38. Woodcock, A. H., Atmospheric salt in nuclei and in raindrops. . . . 43. Cunningham, R. M., A discussion of generating-cell observations with respect to the natural existence of freezing or sublimation nuclei. *Subject Headings: 1. Nuclei conferences. I. U. S. Office of Naval Research II. U. S. Air Force Cambridge Research Center III. American Geophysical Union.*

61-152

551.574.1:06

Dessens, H. (*Puy-de-Dôme Observatory*), Les noyaux de condensation: compte rendu du Colloque de Dublin, 26-28 Avril 1955. [Condensation nuclei: report on the Colloquium at Dublin, April 26-28, 1955.] *Puy-de-Dôme. Observatoire, Bulletin, Ser. 2*, No. 2:54-64, April/June 1955. *OWB*—Papers presented at this Colloquium are listed by title and some have rather long annotations. The authors and titles in English (original or translation) follow: Morgan, W. A. and McWilliams, S. (Ireland), Relation between concentration of atmospheric nuclei and various meteorological elements at Valentia, Ireland. Bider, M. (Switzerland), Results of measurements of nuclei concentration at Basel and comparison with results obtained at some other stations. Israël, H. (Germany), High altitude research in the Alps. Verzár, F. (Switzerland), Biological influence of atmospheric condensation nuclei. Day, G. J. (Great Britain), Preliminary report on measurement of nuclei from aeroplane. Rich, T. A. (U. S.), Modification of the photo-electric counter for measuring nuclei size. Pollak, L. W. and O'Connor, T. C. (Ireland), Decrease in concentration of an aerosol enclosed in a small container, and statistical method for obtaining sizes of condensation nuclei. Fürth, R. (Great Britain), Theory of diffusion and sedimentation of condensation nuclei in a cylindrical container. Nolan, Patrick J. and Kuffel, E. (Ireland), Relation between the coefficient of the linear expression in the regression equation and the coefficient of diffusion. Vittori Antisari, D. (Italy), Determination of the size distribution of atmospheric chloride particles by means of the Liesegang reaction. Pollak, L. W. and O'Connor, T. C., Demonstration of an apparatus for determining concentration and size of nuclei. Pollak, L. W. and Murphy, T. (Ireland), Demonstration of an apparatus for measuring the vertical gradient of nuclei concentration near the ground. Silksna, R. (Sweden), Several construction details of a photoelectric nuclei counter. Holl, W. and Muhleisen, R. (Germany), Continuous-supersaturation nuclei counter. Nolan, P. J. and O'Connor, T. C., Photoelectric counter used as hygrometer. Murphy, T., On the formation of fog in the photoelectric counter. Dessens, H. (France), Investigation of individual cloud droplets residues. Sagalyn, R. C. and Faucher, G. (U. S.), Research on charged nuclei in the atmosphere. Klumb, H.

(Germany), **Methods for measuring highly dispersed aerosols.** Rossby, C.-G. and Egnér, H. (Sweden) **Synoptic variations of the chemical composition of atmospheric precipitation.** Burke, T. and Nolan, P. J. (Ireland), **Nuclei content in the air of an occupied room.** Nolan, P. J. and Kuffel, E. **Nuclei production from ammonia and nitric acid.** Holl, W. and Muhleisen, R. (Germany), **Research on ionization in highly polluted air.** Siksnas, R., **Charged nuclei produced by coronal effect through reversing the polarity of the excitation potential or through using an alternate potential.** O'Connor, T. C., **Some characteristics of condensation nuclei preserved in a large container.** Effenberger, I. (Germany), **General atmospheric aerosol and hygiene.** Volz, F. (Germany), **Optical and meteorological aspects of atmospheric turbidity.** *Subject Heading: 1. Nuclei conferences.*

6I-153

551.574.1:551.594.1

Hess, Victor F., **On the electrical conductivity and the nucleus content of air inside buildings.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A, Vol. 7:262-265, 1954.* 2 refs. English, German and French summaries p. 262-263. **DLC**—Comments are presented on a paper of G. F. SCHILLING and J. CARSON (See item 5.2-301, Feb. 1954, *MAB*) on the continuous recording of the conductivity of air in closed rooms by means of the vibrating reed electrometer and a Brown recorder. Similar observations have been made in 1953 by the author at Mt. St. Vincent near New York. The sudden increases (up to four times the normal value) of the conductivity were also noticed, occasionally, and it is shown that they cannot be explained by assuming a sudden appearance of nuclei; this would have to be of the order of 700,000 nuclei per cm^3 which is about ten times the number observed in cities. It is believed that malfunctioning of the vibrating reed electrometer is the reason for those "spikes" in the record. (Same item as 6.1-343, Jan. 1955, *MAB*) *Subject Heading: 1. Nuclei and atmospheric conductivity.—Author's abstract.*

6I-154

551.574.1:551.578.41(5)

†Isono, K. (Tokyo Univ.), **On ice-crystal nuclei and other substances found in snow crystals.** *Journal of Meteorology, 12(5):456-462, Oct. 1955.* 13 figs., 3 tables, 22 refs. **DWB**—Ice crystal nuclei and other substances found in snow crystals collected in Japan were observed with an electron microscope and identified by means of their electron-diffraction patterns. Among the nuclei observed, clay particles were predominant. Besides these nuclei, minute particles were often found in snow crystals. They were identified as particles of sodium chloride and clays. *Subject Heading: 1. Ice crystal nuclei 2. Clay nuclei 3. Sodium chloride nuclei 4. Electron microscope studies 5. Japan.—Author's abstract.*

6I-155

551.571.4(26)

†Lodge, James P., **A study of sea-salt particles over Puerto Rico.** *Journal of Meteorology, 12(5):493-499, Oct. 1955.* 10 figs., table, 17 refs. **DLC**—Variations of nuclei concentration with altitude, meteorological conditions and with overland trajectory have been studied by the Cloud Physics Project on the basis of measurements made during eleven flights between Dec. 12, 1953 and April 16, 1954 near Puerto Rico. A number of ground samples was also taken. Arrangements used for sampling from aircraft is shown by a drawing, and results of observations are presented in graphs showing 1) the vertical distribution of nuclei content under various conditions and on various days, 2) variation of chloride nuclei concentration at ground level with distance inland, 3) variation of concentration of chloride particles of sizes $\geq 3\mu$, $\geq 6\mu$, and $\geq 10\mu$ with time, from 1205h to 1335h on Dec. 13, 1953, showing the effect of brief rain shower. *Subject Headings: 1. Chloride nuclei 2. Nuclei vertical distribution 4. Puerto Rico.—N.A.S.*

6I-156

551.574

†Pound, Guy M.; Madonna, L. A. and Sciuili, C. M., **Low temperature cloud chamber studies on water vapor.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers, No. 37; Vol. 1:85-132, July 1955.* 11 figs. (incl. photos), table, 38 refs., 8 eqs. **DLC**. Also as: Carnegie Institute of Technology. Metals Research Laboratory, Contract AF 19(122)-185, Scientific Report No. 2, Jan. 1, 1953. 23 p. 11 figs., table, 38 refs. **MH-BH**—The critical supersaturation for the precipitation of water droplets or ice crystals from the vapor was measured between 0°C and -75°C by an expansion chamber technique. Nitrogen was used as the carrier gas, and measurements were made both in the presence and in the absence of an electric field. Existing critical supersaturation data for nucleation of water droplets from the vapor in the presence of an electric field probably represent heterogeneous nucleation. Comparison of data taken in the absence of ions with the Becker-Doering equation shows fair agreement at the higher temperatures but marked deviation at lower temperatures. The temperature dependence indicates that agreement with the Becker-Doering equation at the higher temperatures may be fortuitous. At terminal temperatures below -65°C, the presence of gaseous ions appeared to have no effect on the critical supersaturation. Also the precipitate particles appeared to be spherical above -65°C, while at lower temperatures pro-

precipitation was in the form of ideomorphic ice crystals. These results are in general agreement with the work of SANDER and DAMKOEHLER. However, the present data give additional evidence in support of direct nucleation of ice from the vapor phase below -65°C . *Subject Headings: 1. Nuclei experiments 2. Ions and critical supersaturation.—Authors' abstract.*

6I-157

551.574.1

†Probstein, Ronald F., **Time lag in the self-nucleation of a supersaturated vapor.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 37; Vol. 1:133-145, July 1955. 2 figs., 2 tables, 12 refs., 35 eqs. **DLC.** Reprinted from *Journal of Chemical Physics*, N. Y., 19(5): 19-626, May 1951. **DLC**—Recent experiments have indicated that the quasi-equilibrium Volmer theory of self-nucleation fails in some cases to predict when the condensation of water vapor or the components of air will occur in the very rapid vapor expansions in a supersonic wind tunnel. By the obtaining of an approximate solution to the non-steady Becker-Doering equation for the self-nucleation of a supersaturated vapor, an attempt has been made to determine whether the time lag associated with the approach to the steady state rate of formation of condensation nuclei could account for the discrepancies between theory and experiment. A similar calculation, where the work required to form embryos of the condensing phase was neglected, has been carried out by KANTROWITZ. In the present paper the work term has been taken into account to a first approximation. Also considered is the time lag arising from the heating of the nuclei due to bombardment by molecules of the condensing phase as well as the time lag resulting from an accommodation coefficient for the liquid nuclei different from unity. Calculations of the self-nucleation of water vapor in air and nitrogen in air have been carried out. From the results it appears that the build-up time is not appreciably lengthened by inclusion of the work term to a first approximation. The results also indicate that, unless the accommodation coefficient should have a value much lower than what appears to be reasonable from meager experimental evidence, the time lag alone could not account for the existing discrepancies between theory and experiment. *Subject Headings: 1. Nuclei experiments 2. Self-nucleation theory.—Author's abstract.*

6I-158

551.574.1:551.508.91

Rathje, W. and Stranski, I. N., **Experimental proof of the Volmer theory of the formation of nuclei on ions.** *U. S. Air Force Cambridge Research Center, Geophysical Research Papers*, No. 37; Vol. 1:1-51, July 1955. 28 figs. (incl. photos), table, 13 refs. **DLC**—New apparatus for investigation of the processes of nuclei formation on ions in supersaturated vapors has been developed by M. POLLERMANN. It enabled an experimental examination of the validity of the equations of vapor pressure especially the Volmer one, for single particles, where the thermodynamic conditions are no longer defined unequivocally. Continuous measuring of the electric mobility of ions (produced by X-ray flash) in a special cloud chamber during the adiabatic expansion allows the existing theories of the formation of nuclei, concerning a capacious sphere of supersaturation up to smallest dimensions of the drops to be tested. A special arrangement permits separation of the negative and positive ions from each other and investigation of the formation of nuclei on single ones. The experiments of POLLERMANN have been repeated and confirmed on the whole. New experiments have been carried out in the presence of hydrochloric acid and it has been found that the sign-effect of ions still exists and with all tested solutions the spontaneous condensation occurs on negative ions earlier than on positive ones, i.e. at a smaller rate of supersaturation. *Subject Headings: 1. Nuclei formation 2. Volmer nuclei theory 3. Nuclei instruments 4. Ions 5. Nuclei experiments.—N.A.S.*

6I-159

551.574.1

†Reiss, Howard, **Statistical mechanical theory of irreversible condensation, Pt. 1.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 37; Vol. 1:61-74, July 1955. 2 figs., 23 refs., numerous eqs. **DLC.** Reprinted from *Journal of Chemical Physics*, N. Y., 20(8): 216-1227, Aug. 1952. **DLC**—A theory of nucleation, based on statistical mechanics, is presented. The problem reduces to the computation of the multiple occupation, by molecules, of cells, this being accomplished through the evaluation of the configuration integral for a supersaturated assembly. The new theory does not consider the first fragments of the stable phase formed to be spherical liquid drops. In no place (not even at the nucleus) is it necessary to consider explicitly phase equilibrium between an embryo and the mother phase. The manifold difficulties connected with this point (in view of the small dimensions of typical nuclei) are therefore obviated. Furthermore, it is possible to define an embryo unambiguously, and in such a manner that its energetic properties can, in principle, be computed. This is not possible in the classical theory. Certain limitations on the application of Einstein fluctuation theory to supersaturated systems are demonstrated. *Subject Heading: 1. Nucleation theory.—Author's abstract.*

6I-160

551.574.

Schaefer, Vincent J., **Formation of ice crystals by sublimation.** (Simple experiments in atmospheric physics, pt. 4.) *Weatherwise*, 8(5):118-119; 123, Oct. 1955. 2 figs. DWB—Various types of sublimation nuclei on which snow crystals start growing are characterized by their temperature-activity relationship, which is shown graphically for 21 species. Simple methods for determining the effectiveness of dust particles as ice crystal nuclei are described. *Subject Headings:* 1. Sublimation nuclei 2. Nuclei and temperature 3. Silver iodide nuclei 4. Nuclei experiments.—N.A.S.

6I-161

551.574.

Soulaige, G., **Recherche des noyaux de congélation atmosphériques dans les flocons de neige** [Research on atmospheric ice nuclei in snow flakes.] *Puy-de-Dôme. Observatoire, Bulletin*, n.s. No. 2:42-53, April/June, 1955. 4 figs., table, 6 refs. French and English summaries p. 42. DWB—The residues from melting-evaporation and from sublimation of snow flakes collected at the summit of Puy-de-Dôme have been observed and their activity in forming ice has been experimented down to -40°C . This paper describes the apparatus used and points out the results obtained during winter 1954-1955: a few residues have a threshold of activity between -10 to -20°C but for most of them this threshold is near to -32°C . *Subject Headings:* 1. Ice nuclei 2. Snow crystal nuclei 3. Nuclei instruments 4. Puy-de-Dôme, France.—*Author's abstract.*

6I-162

551.574.

Thomas, J. G. N. and Tompkins, F. C., **Nucleus formation and growth in azides.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 37; Vol. 1:181-195, July 1955. 3 refs. DLC—Experiments with barium azide heated to 100°C , so that specks of barium metal have been formed and having their number and rate of growth measured as a function of time provided data for calculation of the activation energy of pressure increase. Mott's theories for nuclei formation are mathematically analyzed, checked against experimental data and criticized. *Subject Headings:* 1. Nuclei formation 2. Nuclei growth 3. Nuclei experiments 4. Nuclei theories.—N.A.S.

6I-163

551.574.

Vonnegut, Bernard, **Thin films of supersaturated solutions for detecting, counting and identifying very small crystalline particles.** *U. S. Air Force, Cambridge Research Center, Geophysical Research Papers*, No. 37; Vol. 1:53-59, July 1955. ref. DLC. Also as: General Electric Research Laboratory, Schenectady, Contract DA-36-039-sc-15345, Project Cirrus, Occasional Report, No. 3: April 15, 1952. 3 p. DWB—A simple method for identifying and counting crystalline nuclei is described. Experiments have been made with sodium chloride and silver iodide nuclei. This technique may have general use as a method for investigating homogeneous and heterogeneous nucleation. (*Same item as* 6.4-267, April 1955, MAB.) *Subject Headings:* 1. Crystalline nuclei 2. Silver iodide nuclei 3. Homogeneous nucleation 4. Nuclei investigation techniques.—N.A.S.

6I-164

551.574.1:551.594.1

†Wait, G. R. and Parkinson, W. D., **Ions in the atmosphere.** (In: *Compendium of Meteorology*, Boston, American Meteorological Society, 1951. p. 120-127. fig., 4 tables, 58 refs., 9 eqs.) MB BH—In discussing the broad subject of ions in the atmosphere, the authors have outlined briefly the historical researches on this subject and then proceeded to discuss current concepts on ion mobility, nature of slow ions, rate of ionization, small ions (balance, recombination and combination with condensation nuclei), large ion balance, ionic concentration in the lower atmosphere, variation in time and with height, ratio of positive to negative ion concentration, average life of an ion and finally, a few of the unsolved problems in research on ions. (*Same item as* 4.1-14, Jan. 1953, MAB) *Subject Headings:* 1. Ions in the atmosphere 2. Ion mobility 3. Ion theories 4. Ion variations.—M.R.

6I-165

551.574.

†Weickmann, Helmut K., **Theory of the formation of ice crystals.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 37; Vol. 1:205-225, July 1955. 8 figs., 2 tables, 37 refs., 3 eqs. DLC. Reprinted from *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:309-323, 1951. DLC—As is known from laboratory experiments and investigations in the free atmosphere, ice crystal formation is initiated either at vapor saturation with respect to water or by crystallization of a droplet. Nuclei with special properties are needed. An explanation of their effectiveness can be given by application of the laws of oriented overgrowth (Epitaxy) between two crystals. Any host crystal having a plane with a geometrical pattern similar to, for instance, the base plane of the ice crystal can orient an adsorber layer of H_2O molecules already in

the ice crystal pattern. The closer the fit between the two crystal planes, the greater the area of oriented H_2O molecules will be. By piling up other layers of H_2O molecules a very small ice crystal, called "ice seed," is created which can grow in supercooled water. This crystal is so small that according to the Thomson-Gibbs Law a high supersaturation would be needed to create it directly from vapor. Calculation of the effective temperature of mica, AgI and quartz as freezing nuclei are in fairly good agreement with the experiment. This theory permits an explanation of the observed thresholds of ice formation which occur at about -20° , -30° , -40° and $-60^\circ C$. Occasionally capillary condensation of water molecules on a freezing nucleus will occur when the vapor is saturated with respect to ice but not with respect to water; this has frequently been erroneously ascribed to ice formation by a real sublimation nucleus. (For abstract of original, see 3.3-174, March 1952, *JAB*.) *Subject Headings:* 1. Ice nuclei 2. Nuclei effectiveness 3. Silver iodide nuclei 4. Quartz nuclei 5. Nuclei theories 6. Ice crystal formation.—*Author's abstract.*

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Note: The contents of periodicals included in this section are for information only and will not be listed in the monthly indexes until abstracted. When material is furnished in advance of date of publication, the pagination may be omitted.

American Meteorological Society, Bulletin, Vol. 36, No. 7, Sept. 1955

- Haurwitz, B.: The thermal influence on the daily pressure wave, p. 311-317
 Ballenzweig, Emanuel M.: Composite 200-mb temperature fields over extratropical cyclones, p. 318-324
 Lund, Iver A.: Estimating the probability of a future event from dichotomously classified predictors, p. 325-328
 Bryson, Reid A. and Lowry, William P.: Synoptic climatology of the Arizona summer precipitation singularity, p. 329-339
 Ligda, Myron G. H.: Hurricane squall lines, p. 340-342
 Hardy, William E.: Twenty-one years of distinguished service [of Robert G. Stone], p. 343
 Beebe, Robert G.: A tornado development, 17 August 1953, p. 344-347
 Boyd, Donald W.: The climate part of the National Building Code of Canada, p. 347-349
 Beebe, Robert G.: Types of airmasses in which tornadoes occur, p. 349-350
 Berkofsky, Louis and Bertoni, Eugene A.: Mean topographic charts for the entire earth, p. 350-354
 News from our branches, p. 355-357
 Meteorology at Saint Louis University, p. 358-359
 Eastern Underwriters Association, p. 359
 Times Facsimile Corporation, p. 359-360
 American Meteorological Society: Program of the 140th National Meeting, October 3-5, 1955, at Oklahoma A. & M. College, Stillwater, Oklahoma, p. 361-366

Australian Meteorological Magazine, Melbourne, No. 8, March 1955

- Retirement of Director [of Commonwealth Bureau of Meteorology], E. W. Timcke, p. i-ii
 Rainbird, A. F.: Storm of October 20-21, 1953, Victoria, p. 1-20
 Phillpot, H. R. and Stevenson, J. W.: An objective method of forecasting sub-minimum weather conditions at Cambridge Aerodrome, Tasmania, p. 21-32
 Rutherford, G. T.: Comparison of forecast winds with those reported by aircraft on high altitude flights, p. 33-36
 Maine, R. and Pierrehumbert, C.: Constant absolute vorticity trajectories, p. 37-47
 Lynch, K. P.: An unusual pressure fluctuation in the Great Australian Bight, p. 48-50
 Storer, H.: A violent windstorm strikes Mildura and district, p. 51-53
 Dwyer, W. N.: Cloud forms associated with "Jet Streams," p. 55
 Hannay, A. K.: Reply, p. 56

Beiträge zur Geophysik, Leipzig, Vol. 64, No. 4, 1955

- Hesse, W.: August Schmauss, p. 231-232
 Sprenger, K. and Lauter, E. A.: Beobachtungen der tiefen Ionosphäre während der Sonnenfinsternis am. 30.6.1954, [Observations of the low ionosphere during the solar eclipse of June 6, 1954], p. 284-312
 Vorläufiger Bericht über die Beobachtungen am Adolf-Schmidt-Observatorium für Erdmagnetismus in Niemeck in der Zeit vom 1. September 1953 bis 31. August 1954, [Preliminary report on observations at the Adolf-Schmidt Observatory for Geomagnetism at Niemeck, Sept. 1, 1953-Aug. 31, 1954], p. 313-327

Czasopismo Geograficzne, Warsaw, Vol. 25, No. 4, 1954

- Hombek, Maria: Plejstocenski okres pluwialny, [Rainy seasons in the Pleistocene], p. 334-345
 Rulikowska, Joanna and Manikowska, Barbara: Geomorfologiczne znaczenie litologii, [Geomorphic importance of lithology], p. 346-358

Pierzchałko, Lucja: *Zagadnienie dolin asymetrycznych na tle rozwoju geomorfologii klimatycznej*, [Problem of asymmetric valleys in the development of climatic geomorphology], p. 359-372

Mikulski, Zdzisław: *Katastrofalne powodzie w Polsce*, [Disastrous floods in Poland,] p. 380-396

Vol. 26, No. 3, 1955

Czeppe, Z.: *Nowe odkrycia arktyczne*, [New Arctic discoveries], p. 271-272

Migacz, W.: *Nowa mapa basenu arktycznego*, [A new map of the Arctic basin], p. 272-274

Niewiarowski, W.: *Wahania lodowców w r. 1953*, [Movements of glaciers in 1953], p. 274-275

Baraniecki, L.: [Review of] K. G. Tuszinskij; E. F. Guskowa, and W. D. Gubarewa: *Pieriekryształizacja sniegu i woznkonowienie lawin*, [Recrystallization of snow and the formation of avalanches], p. 282-283

Pietkiewicz, S.: *Odczyt prof. S. Kaleśnika o Towarzystwie Geograficznym ZSRR*, [Report of Prof. S. Kalesnik on the Geographical Society of USSR], p. 308-310

Geophysical Magazine, Tokyo, Vol. 26, No. 3, March 1955

Kawabata, Y.: *A study on the deviation of the plumb-line in Japan*, p. 139-213

Japan. Central Meteorological Observatory. Observation Division: *Preliminary report on the atmospheric pressure oscillation due to the H-bomb explosion*, p. 215-223

Sakuraba, S.: *The role of vertical stability in the development of a great anticyclone*, p. 225-230

Arakawa, Akio; Fujita, T.; Ito, H. et al: *Climatic abnormalities as related to the explosions of volcano and hydrogen-bomb*, p. 231-255

mel en Dampkring, The Hague, Vol. 53, No. 5, May 1955

Van den Bergh, G.: *Nogmaals: de totale zonsverduistering van 17 Juni 1433*, [Total solar eclipse of June 17, 1433], p. 92-93

Stoutjesdijk, P.: *Temperatuurmetingen in heidebodem en stuifzand*, [Temperature measurements on moor soil and drift sand], p. 94-96

De Jong, J. J. G.: *De zware sneeuwval op 17 en 18 Februari in Friesland*, [Heavy snowfall of Feb. 17-18, in Friesland], p. 99-100

Vol. 53, No. 7, July 1955

Veldkamp, J.: *Het Internationale Geofysische Jaar 1957/58*, [International Geophysical Year, 1957/1958], p. 129-131

Dufour, L.: *Kan men de mist kunstmatig doen verdwijnen?* [Can fog be dispersed artificially], p. 132-135

Visser, S. W.: *De omgeschreven halo*, [The enveloped halo], p. 136-138

Schuuring, C.: *Atoomexplosies en weersgesteldheid*, [Atomic explosions and weather conditions], p. 139-140

Gregory, P.: *Een eeuw Meteorological Office*, [A century of the British Meteorological Office], p. 141-142

Maenhout, A.: *Vergelijking van radiosondes*, [Comparison of radiosondes], p. 143-144

Van den Bergh, G.: [Review of] C. Kramer; J. J. Post and M. Scharringa: *Verklaring van vele problemen die in de astronomie, meteorologie en klimatologie*, [Explanation of many problems in astronomy, meteorology and climatology], p. 146

Visser, S. W.: *De sneeuw op het dak—En puzzel*, [Snow on the roof: a puzzle], p. 148

Redeker, F.: *Nederlandse Vereniging Voor Weer- en Sterrenkunde, 9. Verslag van de Vergroep Wolden en Onweders over het jaar 1954*, [Ninth meeting of the Working Group on Clouds and Optics of the Netherlands Society for Science and Astronomy in 1954], p. 148-149

ingrad. Tsentral'naia Aerologicheskaiia Observatoriia, Trudy, No. 7, 1952

Zak, E. G. and Marfenko, O. V.: *Struktura nizhnnei kromki oblachnogo pokrova*, [Structure of the lower boundary of cloud cover], p. 3-15

Reshchikova, A. A. and Tonkova, Z. V.: *O sviazi vysoty nizhnnei granitsy oblakov s dal'nost'iu vidimosti*, [The relation between the height of the cloud base and visibility], p. 16-21

Zak, E. G. and Borovikov, A. M.: *K voprosy ob evolutsii postranstvennoi struktury i fazovogo sostoiianiia frontal'nykh oblakov*, [The evolution of the horizontal structure and phase conditions of frontal clouds], p. 22-38

Mazin, I. P.: *Raschet otlozheniia kapel' na kruglykh tsilindricheskikh poverkhnostiakh*, [Calculation of the deposition of drops on round cylindrical surfaces], p. 39-49

- Khrgian, A. Kh.: *Nekotorye dannye o mikrostrukture oblakov*, [Data on the microstructure of clouds], p. 50-55
- Khrgian, A. Kh. and Mazin, I. P.: *O raspredelenii kapel' po razmeram v oblakhakh*, [Distribution of drops according to size in clouds], p. 56-61

Meteorological Magazine, London, Vol. 84, No. 999, September 1955

- Durward, J.: *Second Congress of the World Meteorological Organization*, p. 265-267
- Durward, J.: *Conference of Commonwealth Meteorologists, May 1955*, p. 267-272
- Gloyne, R. W.: *Some effects of shelter-belts and wind-breaks*, p. 272-281
- Howe, G. Melvyn: *A South Wales thunderstorm*, p. 281-286
- Ashmore, S. E.: *Unusual halo phenomena*, p. 287-288
- Hughes, R. G.: *Unusually low temperatures in Hong Kong*, p. 288
- Booth, R. E.: *An exceptionally cold day in May*, p. 288-289
- Pestell, E. and Smith, C. V.: *Funnel cloud at Luton, June 8, 1955*, p. 289-290
- Retirement of P. N. Skelton*, p. 290-291
- Shellard, H. C.: [Review of] C. E. P. Brooks: *The English climate*, p. 291-293
- Bull, G. A.: [Review of] A. C. B. Lovell: *Meteor astronomy*, p. 293-294
- Weather of July 1955*, p. 294-296
- Rainfall of July 1955*, p. 296

Meteorologiya i Gidrologiya, Leningrad, No. 4, July/August, 1955

- Bykov, V. V.: *K voprosu o vliianii gor na izmerenie davleniia v srednei troposfere*, [Influence of mountains on pressure change in the middle troposphere], p. 3-12
- Lednev, V. A.: *Izmeneniia gidrologicheskogo rezhima Azovskovo, Aral'skogo i Kaspiiskogo morei pri umen'shenii stoka rek*, [Variations in hydrologic regime of Azov, Aral and Caspian seas during decrease of river discharge], p. 13-20
- Alpat'ev, A. M.: *O pokazatele zasukhi*, [Drought index], p. 21-24
- Bagrov, N. A. and Morskoi, G. N.: *Metod otsenki prognozov*, [Method of evaluating forecasts], p. 24-28
- Shishkov, V. G.: *Rol' nekotorykh priznakov tekushchego estestvennogo sinopticheskogo perioda dlia prognoza sleduiushchego estestvennogo sinopticheskogo perioda*, [The role of some characteristics of the current natural synoptic period in forecasting subsequent natural synoptic periods], p. 28-31
- Gavrilenko, N. M.: *Sinopticheskie uslovia prodolzhitel'nykh osadkov v Kievskoi oblasti*, [Synoptic conditions for continuous precipitation in the Kiev region], p. 31-34
- Imianitov, I. M. and Chuvaev, A. P.: *Ob osnovnom mekhanizme elektrizatsii grozovykh oblakov*, [Basic mechanism of electrification of thunder clouds], p. 34-36.
- Uryvaev, P. A.: *Vodootdacha iz snega v pole i lesu*, [Water supply from snow in field and forest], p. 36-39
- Sapozhnikov, V. I.: *Prognoz letnego stoka Volgi u Kuibyshevskoi GES*, [Forecasting the summer discharge of the Volga at the Kuibyshev hydroelectric power station], p. 39-42
- Ogir', I. P.: *Opyt raboty Komissii po izobretatel'stvu i ratsionalizatsii UGMS Dal'nego Vostoka*, [Work of the Commission for Invention and Rationalization of the Far East Hydrometeorological Service], p. 43
- Shesterikov, N. P.: *Opyt opredeleniia popravok na devyatsiiu pri izmerenii techenii*, [Determining the corrections for deviation in measurement of currents], p. 44-45
- Andreeva, N. A. and Marshunova, M. S.: *Primenenie termoelektricheskikh balansomera i pirgeometrov dlia opredeleniia effektivnogo izlucheniia*, [Application of the thermoelectric balance meter and pyrometer to determine effective radiation], p. 46-48
- Khakhalin, V. S.: *Uluchshenie otschetov obychnogo aspiratsionnogo psikhrometra s pomoshch'iu tsilindricheskikh linz*, [Improvement of readings from ordinary aspiration psychrometer by the use of cylindrical lenses], p. 48
- Simonov, Ia. P. and Shumeiko, V. P.: *Ob universal'noi modeli geliografa*, [Universal model of the heliograph], p. 49
- Gur'ev, A. I.: *Gidravlicheskiĭ printsip uvelicheniia masshtaba zapisi urovnei vody*, [Hydraulic principle to increase the scale of registration of water levels], p. 49-51
- Stepaniuk, G. N.: *Ustroistvo gidrometricheskogo mostika*, [Construction of hydrometric foot bridge], p. 51
- Gurbanidze, Sh. A.: *Novye pribory—bez ucheta dostizhenii tekhniki*, [New apparatus—without considering technical achievements], p. 52
- Gersht, E. P.: *K 60-letiiu so dnia izobretenii radio*, [The 60 years since the invention of radio], p. 53

- Sagatovskii, N. V.: [Review of] L. A. Kuz'min and G. B. Matinian: *Meteorologicheskie nabliudeniia v shkole*, [Meteorological observations in school], p. 54-56
- Aleksandrov, L. N.: [Review of] V. I. Chebotarev and A. R. Skue: *Gidrometricheskie sooruzheniia*, [Hydrometric construction], p. 56-57
- Pagava, S. T.: *Otvety retsentsentam*, [Reply to reviewers], p. 57-58
- Samollov, I. V.: Professor B. A. Apollov, [Biography], p. 59-60
- Krupa, V. A.: O vystavke ekonomicheskikh i kul'turnykh dostizhenii Sovetskogo Soiuza v Pekine, [Exhibition of economic and cultural achievements of Soviet Union in Pekin], p. 60-61
- Nauchnye soveshchaniia i konferentsii, [Scientific meetings and conferences], p. 61-62
- Bulavko, A. G.: *Kinofil'm "Razvedchiki pogody"*, [Movie "Weather scouts"], p. 63
- Borisova, E. E.: *Vtoraia spartakiada uchashchikhsia gidrometektchnikumov*, [Second athletic meet of students of the hydrometeorological technical school], p. 63
- Montreal. University. Department of Chemistry, Use of a diffusion cloud chamber to characterize condensation nuclei. Contract AF 19(122)-380, Final Report, May 31, 1954
- Schiff, Daphne and Schiff, H. I.: The use of a diffusion cloud chamber to characterize condensation nuclei, p. 1-7
- Schiff, Daphne: Cloud chamber construction and operation, p. 8-12
- Corbeil, R.: Production of monodispersed nuclei and measurement of their size, p. 13-15
- Bissonnette, F.: A study of the production of monodispersed NaCl nuclei, p. 16-20
- Schiff, Daphne: Heat of adsorption measurements, p. 21-27
- Lévesque, J.: Study of the size distribution of NaCl nuclei, p. 28-32
- Nature, London, Vol. 175, No. 4455, March 19, 1955
- Kraus, John D.: Distribution of radio brightness across the Andromeda nebula, p. 502-503
- Rush, J. H.: A semi-annual periodicity in the beginnings of recurrent magnetic storm series, p. 517-518
- Vol. 175, No. 4456, March 26, 1955
- Gold, T.: Instability of the earth's axis of rotation, p. 526-529
- Miller, William A.: Intensity variation in sunspots, p. 557-558
- Vol. 175, No. 4459, April 16, 1955
- Crombie, D. D.: Doppler spectrum of sea echo at 13.56 Mc/s, p. 681-682
- Manley, R. St. Jr.; Arlov, A. P. and Mason, S. G.: Rotations, orientations and collisions of suspended particles in velocity gradients, p. 682-683
- Vol. 175, No. 4468, June 18, 1955
- Pollack, L. W.: Condensation nuclei: Symposium in Dublin, p. 1072-1073
- Radio emission from Jupiter, p. 1074
- Davies, R. D. and Williams, D. R. W.: An alternative identification of the radio source in the direction of the galactic centre, p. 1079-1081
- Vol. 175, No. 4469, June 25, 1955
- Blackett, P. M. S.: Obituary of Prof. E. Regener, p. 1107-1108
- Vol. 176, No. 4474, July 30, 1955
- Reasbeck, P. and Mayne, K. I.: The ages and origin of meteorites, p. 186-188
- Ko, H. C. and Kraus, J. D.: Radio-frequency radiation from the Rosette nebula, 221-222
- Vol. 176, No. 4476, August 13, 1955
- Brunt, David: Exploration of the earth's upper atmosphere using high-altitude rockets, p. 282-283
- Negri, N. C.: Winter observations on a zone of climatic modification in the Norwegian arctic, p. 292-293
- Jenkins, D. C.: Erosion of surfaces by liquid drops, p. 303-304
- Kraus, J. D.; Ko, H. C. and Stoutenburg, D. V.: A fluctuating celestial radio source at 240 megacycles per second, p. 304-305

Vol. 176, No. 4477, August 20, 1955

Goodhart, C. B. and Thomas, H. Hamshaw: *Instability of the earth's axis*, p. 349

Vol. 176, No. 4479, September 3, 1955

Day, A. A. and Runcorn, S. K.: *Polar wandering: some geological, dynamical and palaeomagnetic aspects*, p. 422-426

Elsmore, B. and Whitfield, G. R.: *Lunar occultation of a radio star and the derivation of an upper limit for the density of the lunar atmosphere*, p. 457-458

Preston, R. L. and Hogg, B. G.: *Radioactive fall-out in Kingston, Canada*, p. 459

Rao, M. Srirama and Rao, B. Ramachandra: *Long-period fading in medium-wave signals*, p. 459-460

Vol. 176, No. 4482, September 24, 1955

Hughes, R. Elfyng: *Ecology of livestock productivity*, p. 595-596

Bradshaw, A. D. and Pritchard, Tom: *Wild white clover in natural mountain grassland*, p. 596

Stoffregen, W.: *Variation of fEs during solar eclipses*, p. 610

Oceanographical Magazine, Tokyo, Vol. 6, No. 4, Jan. 1955

Sugiura, Jiro: *On the transport in the Eastern Sea of Honshu, Pt. 1, Conditions during 1949/1950*, p. 153-163

Moriyasu, Shigeo: *On the variation of water temperature and chlorinity after heavy precipitation in the Osaka-Wan and the Kii-Suido*, p. 175-180

Fukuoka, Jiro: *Variation of the [ocean] polar front in the sea adjacent to Japan*, p. 181-195

Polar Record, Cambridge, England, Vol. 6, No. 45, January 1953

Robin, G. de Q.: *Norwegian-British-Swedish Antarctic Expedition, 1949-52*, p. 608-616

Reece, Alan: *The base of the Norwegian-British-Swedish Antarctic Expedition, 1949-52*, p. 617-630

Vol. 7, No. 47, January 1954

Pugh, H. Ll. D. and Price, W. J.: *Snow drifting and the use of snow fences*, p. 4-23

Victor, Paul-Émile: *The supply of expeditions by aircraft*, p. 24-31

Reece, Alan: *Sledge dogs of the Norwegian-British-Swedish Antarctic Expedition, 1949-52*, p. 32-37

Vol. 7, No. 49, January 1955

Armstrong, Terence: *Soviet work on sea-ice forecasting*, p. 302-311

Obituary of Professor Antoni Bolesław Dobrowolski, p. 343

Przegląd Geograficzny, Warsaw, Vol. 26, No. 4, 1954

Dylik, Jan: *Problematyka geomorfologiczna wobec potrzeb rolnictwa*, [Geomorphological problems as related to agricultural needs], p. 4-36

Pierzchalko, Lucja: *Wstępne obserwacje współczesnych procesów stokowych w Górach Kaszawskich*, [Preliminary investigations of present-day slope erosion in Kaszawa Mountains], p. 136-145

Roguski, Wacław: *Charakterystyka klimatu lokalnego pradoliny Wisły na zachód od Bydgoszczy z punktu widzenia potrzeb rolnictwa*, [Characteristics of the local climate in the old Valley of the Vistula, West of Bydgoszcz, from the agricultural point of view], p. 146-154

Revista de Geofísica, Madrid, Vol. 14, No. 53, January/March 1955

Bonelli Rubio, Juan and Carrasco, Luis Esteban: *La magnitud de los sismos en Toledo*, [Magnitude of earthquakes in Toledo], p. 1-12

Rey Pastor, Alfonso: *Contribución de la ciencia del magnetismo a la geología: región NW. de España*, [Contribution of the science of magnetism to geology: northwest region of Spain], p. 13-30

Garmendia Iraundegui, José: *Sobre el método del fluido asociado a un corpúsculo*, [On corpuscular fluid motion], p. 31-33

Jansa Guardiola, José M.: *El "muro atmosférico"*, [The atmospheric "wall"], p. 35-50

Due Rojo, Antonio: *El pronóstico del tiempo a largo plazo*, [Long range forecasting], p. 51-59

Sans Huelin, Guillermo: *Symposium sobre la erosión del terreno*, [Symposium on soil erosion], p. 61-65

- Personal técnico del Instituto Nacional de Geofísica en enero de 1955**, [Technical staff of the National Institute of Geophysics in Jan. 1955], p. 67-69
- Cardús, J. O. : Nota relativa a la actividad solar y geomagnética, octubre-diciembre 1954**, [Note on solar and geomagnetic activity, Oct.-Dec. 1954], p. 71-80

Vol. 14, No. 54, April/June 1955

- Lozano Calvo, Luis: La precisión en los cálculos de los potenciales de gravedad**, [Precision in the calculation of gravity potentials], p. 91-100
- Rey Pastor, Alfonso: Estudio morfo-tectónico de la Falla del Guadalquivir**, [Morpho-tectonic study of the Guadalquivir fault], p. 101-137
- Font Tullot, Inocencio: Perturbaciones tropicales del tiempo atmosférico en la región de Canarias y Sáhara Español**, [Tropical weather disturbances in the region of the Canary Islands and of Spanish Sahara], p. 139-152
- Cardús, J. O. : Nota relativa a la actividad solar y geomagnética, enero-marzo 1955**, [Note on solar and geomagnetic activity, Jan./March 1955], p. 173-182
- Sans Huelin, Guillermo: Colaboración internacional en el Antártico con motivo del Año Geofísico 1957-58**, [International cooperation in the Antarctic motivated by the 1957/58 Geophysical Year], p. 189-193
- Nicolet, M. : L'aéronomie et sa nomenclature**, [Aeronomy and its nomenclature [Review by G. Sans Huelin]], p. 201-202
- Harris, D. Lee: Effects of radioactive debris from nuclear explosions on the electrical conductivity of the lower atmosphere** [Review by G. Sans Huelin], p. 203-204

PART IV. AUTHOR AND SUBJECT INDEXES

In this section will be found reference to the numbers given at the head of each abstract or entry. In Part I each entry begins with 6.9-, and in Part II, in the bibliography on Condensation Nuclei each entry begins with 6I-. This index is divided into three parts:

Index of Authors

Index of Subjects

Index of Geographical Locations

INDEX OF AUTHORS

- Ångström, Anders, 6.9-24
 Ackermann, Paul, 6I-96, 6I-97
 Agaard, Bjarne, 6.9-43
 Aliverti, Giuseppina, 6I-65,
 6I-66, 6I-151
 American Geophysical Union,
 6.9-31
 Am. Physical Society, 6.9-4
 Amrithan, K. G., 6.9-112
 Anderson, C. N., 6.9-49
 Anderson, Charles E., 6I-130,
 6I-151
 Appleton, Sir E., 6.9-84
 Armour Research Foundation,
 Chicago, 6.9-240, 6I-90, 6I-
 98, 6I-99
 Arnold, A., 6.9-203
 Arons, A. B., 6I-111
 Attmannspacher, W., 6.9-189
 Aubert de La Rue, Edgar
 6.9-280
 aufm Kampe, H. J., 6I-30

 Båth, Markus, 6I-79
 Baktavatsalu, C. M., 6.9-259
 Balasubramaniam, C., 6.9-259
 Baratoux, M., 6.9-321
 Barger, G. L., 6.9-300
 Barrows, J. S., 6.9-330
 Baskerville, F. W., 6.9-299
 Batchelor, G. K., 6.9-4
 Bates, Ferdinand C., 6.9-142
 Bauer, Albert, 6.9-58
 Baum, Werner A., 6.9-40
 Bedford, Thomas, 6.9-1
 Beebe, Robert G., 6.9-142
 Belgium. Institut Royal
 Météorologique, 6.9-85
 Benseman, R. F., 6.9-108
 Benton, George S., 6.9-228
 Berger, I. A. M., 6.9-44
 Bernard, E. A., 6.9-111
 Bernasconi, Carlo, 6.9-143
 Berthier, P., 6.9-96
 Best, A. C., 6I-67, 6I-129
 Bethwaite, F. D., 6.9-163

 Bider, Max, 6I-68, 6I-97, 6I-
 100, 6I-152
 Birstein, Seymour J., 6I-130,
 6I-131, 6I-151
 Blackett, P. M. S., 6.9-46
 Bleeker, W., 6.9-29
 Blomstrand, John, 6.9-105
 Blue Hill Meteorological Ob-
 servatory, 6.9-2
 Bock, J. E., 6.9-72
 Boeger, Alberto, 6.9-269
 Bolton, J. G., 6I-101
 Bond, T. E., 6.9-302
 Booth, R. E., 6.9-264
 Bossolasco, Mario, 6I-102
 Boston Univ. Upper Atmos-
 sphere Research Laboratory,
 6.9-98, 6I-2, 6I-3
 Boughner, C. C., 6.9-159
 Bowen, E. G., 6I-69
 Boyce, Steve G., 6I-1
 Braham, R. R., Jr., 6I-151
 Breckenridge, John R., 6.9-303
 Brooklyn Polytechnic Insti-
 tute. Dept. of Chemistry,
 6I-75
 Brooks, Charles F., 6.9-2
 Brooks, Eleanor S., 6.9-2
 Brown, J. R., 6.9-1
 Büdel, Julius, 6.9-261, 6.9-293
 Buettner, K., 6.9-301
 Bullrich, K., 6.9-323
 Burgos, Juan Jacinto, 6.9-309
 Burke, 6I-152
 Burkhard, Marvin D., 6I-42
 Burt, Wayne V., 6I-103
 Butkovich, T. R., 6.9-238

 Cadambe, V., 6.9-219
 Calabrese, Lindoro, 6.9-294
 California. Univ. Institute of
 Geophysics, 6.9-9
 Camerouns. Service Météor-
 ologique, 6.9-86
 Canada. Meteorological Div.,
 6.9-87

 Capello, Carlo Felice, 6.9-271
 Carino, I., 6.9-162
 Carnahan, Robert L., 6.9-228
 Carnegie Inst. of Technology
 Metals Research Lab., 6I-56,
 6I-156
 Carpenter, Martha (Stahr)
 6.9-41
 Carpenter, S. B., 6.9-113
 Chaldecott, J. A., 6.9-45
 Chamberlain, Joseph W., 6.9-
 336
 Chandrasekhar, S., 6.9-4, 6.9-
 204
 Chapman, Sydney, 6.9-128,
 6.9-331
 Chew, Frank, 6.9-53
 (Chu, Co-ching), 6.9-44
 Cockcroft, Sir John, 6.9-74
 Cohn, Howard, 6.9-186
 Coleman, Thomas L., 6.9-6,
 6.9-64
 Coles, Willard D., 6.9-242
 Collins, F. C., 6I-75, 6I-149
 Collins, G. O., 6.9-125
 Colqui, Benito S., 6.9-62
 Columbia University. Dept.
 of Chemistry, 6I-31
 Conference on Auroral Physics
 6.9-3
 Conference on Interfacial Phen-
 omena and Nucleation
 Boston Univ., Aug. 1955,
 6I-150
 Conference on Physics of Clouds
 and Precip. Particles, Wood-
 Hole Oceanog. Inst., Sep-
 1955, 6I-151
 Conover, John H., 6.9-2
 Conover, W. C., 6.9-190
 Contract AF 19(122)-49, 6.9-
 223
 Contract AF 19(122)-185, 6I-
 56, 6I-156
 Contract AF 19(122)-164, 6I-
 31

LIST OF PERIODICALS

Note: This list contains the titles of the periodicals which regularly contain material on meteorology or related fields and it comprises only a small percentage of the periodicals from which pertinent articles are abstracted. The preferred form of title entry is given in bold face type.

PERIODICALS IN WHICH METEOROLOGICAL ARTICLES REGULARLY APPEAR

- Académie des Sciences, Paris, *Comptes Rendus*.
 Acta Geophysica Polonica, [Warsaw].
 Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. and Ser. Geofiz., [Moscow].
 American Geophysical Union, Transactions, National Research Council, Washington.
 American Meteorological Society, Bulletin, [Boston].
 Angewandte Meteorologie, [Potsdam].
 Annales de Géophysique, Centre National de la Recherche Scientifique, [Paris].
 Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A and Ser. B, [Vienna].
 Australian Journal of Physics, [Melbourne].
 Australian Meteorological Magazine, [Melbourne].
 Ciel et Terre, Société Belge d'Astronomie, Météorologie et Physique du Globe, [Brussels].
 Geofisica e Meteorologia, Società Italiana di Geofisica, [Genoa].
 Geofisica Pura e Applicata, Istituto Geofisico Italiano, [Milan].
 Geophysical Magazine, [Central Meteorological Observatory, Tokyo].
 Hemel en Dampkring, [The Hague].
 Időjárás, Magyar Meteorológiai Társaság and Országos Meteorológiai Intézet, [Budapest].
 Indian Journal of Meteorology and Geophysics, [Delhi].
 Journal of Atmospheric and Terrestrial Physics, [London].
 Journal of Geophysical Research, [Washington].
 Journal of Meteorological Research, [Tokyo].
 Journal of Meteorology, American Meteorological Society, [Boston].
 Journal Scientifique de la Météorologie, Société Météorologique de France, [Paris].
 The Marine Observer, Air Ministry, Meteorological Office, London.
 The Meteorological Magazine, Air Ministry, Meteorological Office, London.
 Meteorological Society of Japan, Journal, Second Series, [Tokyo].
 La Météorologie, Société Météorologique de France, [Paris].
 Meteorologiya i Gidrologiya, [Leningrad].
 Meteorologische Rundschau, [Berlin].
 Meteoros, [Buenos Aires].
 Monthly Weather Review, U. S. Weather Bureau, Washington, D. C.
 Polarforschung, Archiv für Polarforschung, [Kiel, Germany].
 Przegląd Meteorologiczny i Hydrologiczny, [Warsaw].
 Revista de Geofísica, Instituto Nacional de Geofísica, [Madrid].
 Revista Meteorologica, Junta Nacional de Meteorología, Montevideo.
 Rivista di Meteorologia Aeronautica, Associazione Culturale Aeronautica. [Rome].
 Royal Meteorological Society, Quarterly Journal, [London].
 South Africa. Weather Bureau, Notes, [Pretoria].
 Tellus, Svenska Geofysiska Föreningen, Stockholm.
 Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia, [Moscow-Leningrad].
 Weather, Royal Meteorological Society, [London].
 Weatherwise, American Meteorological Society, [Boston].
 Wetter und Leben, Österreichische Gesellschaft für Meteorologie, [Vienna].
 WMO Bulletin, World Meteorological Organization, [Geneva].
 Zeitschrift für Meteorologie, Meteorologisches Observatorium, Potsdam.

* Indicates those periodicals which are primarily meteorological.

TABLE OF CONTENTS

Meteorological Abstracts and Bibliography, Volume 6, Number 9, Sept. 1955

Foreword.....	127
Explanations.....	127

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

General and Special.....	1227	Temperature.....	1227
Collected Works.....	1227	Soil Temperature.....	1227
Textbooks.....	1229	Water Temperature.....	1227
Monographs.....	1230	Pressure and Wind.....	1227
General Geophysics and Meteorology.....	1231	Pressure.....	1227
Expeditions.....	1231	Turbulence.....	1227
Observatories.....	1232	Wind.....	1227
Institutions.....	1233	Special Winds.....	1227
Societies.....	1235	Wind Effects.....	1227
Networks and Services.....	1235	Upper Air Winds.....	1227
Practical and Applied Meteorology.....	1236	Vertical Currents.....	1228
Bibliography and Education.....	1236	Aqueous Vapor and Hydrometeors.....	1228
History and Biography.....	1237	Humidity.....	1228
Astrophysics.....	1238	Evaporation and Evapotranspiration.....	1228
Oceanography and Marine Meteorology.....	1239	Condensation.....	1228
Glaciology.....	1241	Fog.....	1228
Aviation Meteorology.....	1242	Clouds.....	1228
Agricultural Meteorology.....	1243	Precipitation.....	1228
Industrial and Medical Meteorology.....	1244	Snow and Hail.....	1228
Meteorological Observations and		Hydrometeorology.....	1229
Instruments.....	1245	Climatology and Bioclimatology.....	1229
Methods of Observation.....	1245	Climatology.....	1229
Observational Data.....	1247	Climate of Particular Places.....	1229
Instrument Carriers.....	1250	Climatic changes.....	1229
Instruments.....	1251	Microclimatology.....	1229
Synoptic Analysis and Forecasting.....	1253	Climatic Classification.....	1229
Structure and Physics of the Atmosphere.....	1257	Bioclimatology.....	1229
Structure of the Atmosphere.....	1257	Environmental Influences.....	1229
Atmospheric Pollution.....	1258	Upper Air and Synoptic Climatology.....	1229
Upper Atmosphere—Ionosphere.....	1259	Miscellaneous.....	1300
Mechanics and Thermodynamics of the		Solar Influences.....	1300
Atmosphere.....	1260	Visibility.....	1300
General Circulation.....	1263	Optical Phenomena.....	1300
Atmospheric Disturbances.....	1264	Electrical Phenomena.....	1300
Radiation and Temperature.....	1267	Auroras.....	1300
Radiation.....	1267	Acoustical Phenomena.....	1300

PART II. ANNOTATED BIBLIOGRAPHY ON ATMOSPHERIC NUCLEI (1951-1955)

Introduction.....	1300
Outline of Contents.....	1300
Supplementary Material.....	1330

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

134

PART IV. AUTHOR AND SUBJECT INDEXES

Index of Authors.....	135
Index of Subjects.....	135
Index of Geographical Locations.....	136
List of Periodicals.....	Cover